● Original article

PATIENTS WITH DRY EYE ADMITTED TO AN INTENSIVE CARE UNIT

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ABSTRACT: Objective: to identify clinical and sociodemographic characteristics of patients with dry eye admitted to an intensive care unit. Method: observational and descriptive study with a quantitative approach conducted in a university hospital from January to June 2016, through the use of a form with questions on sociodemograpic characteristics and clinical data related to dry eye. After diagnostic inference, a sample of 108 patients was obtained. Descriptive analyzes, association measures and prevalence ratios were performed with the use of a statistical package. **Results:** there was a prevalence of male patients (53.7%), mean age of 57 years; 61 (56.6%) with hypertension; 84 (77.8%) with complete closure of the eyelid in the right eye and 80 (74.1%) with complete eyelid closure in the left eye; 44 (40.7%) with right eye hyperemia and 41 (38%) with left eye hyperemia. Schirmer test detected a reduced tear volume, median of 3 mm in the right eye and 4 mm in the left eye. **Conclusion**: Relevant information for the characterization of patients with dry eye, prediction of the phenomenon and delivery of proper care was identified.
KEYWORDS: Dry eye syndromes; Eye health; Critical care; Intensive care unit.

CARACTERÍSTICAS DOS PACIENTES COM RESSECAMENTO OCULAR INTERNADOS EM UNIDADE DE TERAPIA INTENSIVA

RESUMO: Objetivo: identificar características clínicas e sociodemográficas dos pacientes com ressecamento ocular internados em Unidade de Terapia Intensiva. **Método:** estudo quantitativo, observacional descritivo, realizado em hospital universitário no período de janeiro a junho de 2016, com instrumento composto por dados sociodemográficos e clínicos relacionados ao ressecamento ocular. Após inferência diagnóstica obteve-se amostra de 108 pacientes. Foram realizadas as análises descritivas, medidas de associação e razão de prevalência por meio de pacote estatístico. **Resultados:** constatou-se predomínio do sexo masculino com 58 (53,7%) pacientes, idade média 57 anos, 61 (56,6%) com hipertensão arterial, 84 (77,8%) com fechamento palpebral completo em olho direito e 80 (74,1%) esquerdo, 44 (40,7%) com hiperemia no olho direito e 41 (38%) esquerdo. Teste de *Schirmer* identificou volumetria insuficiente, mediana de 3 milímetros no olho direito e 4 milímetros no esquerdo. **Conclusão**: identificou-se informações relevantes para caracterização dos pacientes com ressecamento ocular, predição do fenômeno e consequente assistência qualificada.
DESCRITORES: síndromes do olho seco; Saúde ocular; Cuidados críticos; Unidade de terapia intensiva.

PACIENTES CON SEQUEDAD OCULAR INTERNADOS EN UNIDAD DE TERAPIA INTENSIVA

RESUMEN: Objetivo: identificar características clínicas, sociales y demográficas de los pacientes con sequedad ocular internados en Unidad de Terapia Intensiva. **Método:** estudio cuantitativo, observacional descriptivo, realizado en hospital universitario en el periodo de enero a junio de 2016, con instrumento compuesto por datos socio demográficos y clínicos asociados a la sequedad ocular. Tras la inferencia diagnóstica, se obtuvo muestra de 108 pacientes. Se realizaron análisis descriptivos, medidas de asociación y razón de prevalencia por medio de paquete estadístico. **Resultados:** se constató predominio del sexo masculino con 58 (53,7%) pacientes, edad media 57 años, 61 (56,6%) con hipertensión arterial, 84 (77,8%) con cerramiento palpebral completo en ojo derecho y 80 (74,1%) izquierdo, 44 (40,7%) con hiperemia en el ojo derecho y 41 (38%) izquierdo. Test de *Schirmer* identificó volumetría insuficiente, mediana de 3 milímetros en el ojo derecho y 4 milímetros en el izquierdo. **Conclusión**: se identificaron informaciones relevantes para caracterización de los pacientes con sequedad ocular, predicción del fenómeno y consecuente asistencia cualificada.
DESCRIPTORES: Síndrome del ojo seco; Salud ocular; Cuidados críticos; Unidad de terapia intensiva.

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● INTRODUCTION

One of the main factors that explain the great interest in eye health is the approach to the topic by the World Health Organization (WHO). In 2013, the Organization adopted the Universal Eye Health, a global action plan aimed to reduce the rates of eye diseases between 2014-2019. The plan proposes the adoption of strategies and changes in health practices to prevent avoidable visual impairment by health organizations, institutions and professionals, since visual impairment, especially blindness, is considered a public health problem, because, according to estimates of the World Health Organization, nearly 80% of the cases of blindness are due to avoidable causes[1].

The dry eye syndrome, a condition that precedes inflammation of the cornea, is defined as a multifactorial disease characterized by tear film instability due to changes in one or more elements that form the lacrimal function unit. If not treated, the disorder results in irreversible functional impairment [2].

Eye dryness, in turn, is a human response to disorders and is a critical attribute of the dry eye syndrome, which is inferred through a positive test that measures the tear film volume, associated to an eye sign and/or symptom[3].

Health care provided in intensive care units (ICUs), prioritizes the essential systemic functions for life maintenance. Consequently, eye care is often neglected, leading to complications during hospitalization. Studies on the subject found that the risk factors predisposing to the emergence of eye damage (as a consequence of the dry eye syndrome) detected in ICU environments included, among others, use of invasive ventilation, muscle blockers, edema and sedation. Also, the probabilities of occurrence of eye injuries vary according to length of hospital stay, use of invasive devices for ventilation and drug use[4].

Thus, eye care (even if only partial) must be provided to patients admitted to the ICU, in order to avoid permanent damage capable of interfering with the individuals' quality of life[5].

Based on the aforementioned, the following research question was defined: what are the clinical and sociodemographic characteristics of patients with dry eye admitted to intensive care units?

The importance of identifying the clinical and sociodemographic characteristics of patients admitted to the ICU, in order to demonstrate the occurrence of these variables in patients with dry eye provides a justification for this study.

The present study aimed to identify clinical and sociodemographic characteristics of patients with dry eye admitted to intensive care units. The study was conducted in accordance to the World Health Organization's recommendations and aims to provide a valuable contribution to the understanding of this condition and to the reduction of its prevalence.

● METHODOLOGY

Observational and descriptive study with a quantitative approach conducted in a referral university hospital from January to June 2016, located in the city of Natal, Rio Grande do Norte, Brazil.

The participants were admitted to an adult intensive care unit and met the following inclusion criteria: patients who have been admitted to the ICU for more than 24 hours; aged 18 years or over; without eye damage related to insufficient lubrication or undergoing eye treatment at the time of data collection, and who were diagnosed with dry eye through diagnostic inference, by two medical experts. Agitated patients or patients receiving emergency care during data collection were excluded.

To reduce bias, prior to the beginning of data collection, a theoretical/ practical calibration training was provided to assess rating accuracy, inter-rater reliability and other measures of performance. After the training, a blind assessment was performed, and only the interviewers who obtained a score equal to or greater than 7.0 were considered fit to perform data collection.

Data was collected from January to June 2016 by means of structured interviews. A form consisting of clinical and sociodemographic data was used. The variables related to sociodemographic data were gender, age, marital status, place of birth, place of residence, educational level, occupation, monthly family income, dependent family members, and whether or not the patients had religious beliefs.

Eye assessment of the selected patients was performed once, and included the following variables: exposure keratopathy, hyperemia, mucous secretion, eyelid edema, conjunctival edema (chemosis), conjunctival hemorrhage, proptosis and Schirmer's test.

Schirmer test is used to diagnose dry eye based on tear volume. The test is performed with a standard strip with 5 mm width and 35 mm length. The strip was bent at the notch, and the 5 mm end was placed in the lower eyelid. The bent part was inserted in the outer portion of the lower eyelid for 5 minutes in the patient with the eyes closed. Then the strip was removed and the length of paper wetting in millimeters was measured. The test is considered negative (normal) when the measurement is greater than or equal to 10 millimeters[6].

The present study is part of a larger investigation whose sample was obtained through calculation of finite populations $n = Z_\alpha 2.p.q.N / [Z_\alpha 2.p.q + (N-1) .e^2]$, which resulted in 206 patients. This sample was submitted to diagnostic inference, according to eye assessment variables. The inference was made by two specialists from the Center for Studies and Research in Clinical Nursing (NEPEC) of Universidade Federal do Rio Grande do Norte. Different interpretations were resolved and consensus was reached, according to which a sample of 108 patients with dry eye was determined.

The criteria for detection of dry eye were patients with a positive test for tear film volume associated with an eye sing and/or symptom, which include discomfort and/ or visual disturbances[3].

The data obtained was organized using double entry and exported to a statistical data package for analysis. For descriptive analysis, the frequencies, measures of the distribution center and their variabilities were considered. For assessment of normal normality, tests of asymmetry (skewness), perfect peakedness (kurtosis)[7] as well as Shapiro-Wilk test were conducted. Pearson's Chi-square test for nominal categorical data was used to measure the association between variables, and when the expected frequencies were less than 5, Fisher exact test was applied. Prevalence Ratio was used to verify the magnitude of the association.

Prior to data collection, the participants were asked to sign the Informed Consent Form (ICF) in two copies. One copy was filed in the medical records when the participant was mentally capable of giving consent or handed to the partner/family member responsible for the patient, and the other one was handed to the research coordinator. Also, data confidentiality was ensured, as well as its use in scientific research. The study complied with the ethical principles of Resolution 466/2012 of the National Health Council (CNS)[8] according to protocol no 918,510.

● **RESULTS**

The sociodemographic data of the sample are shown in Table 1. Of the 108 patients who had dry eye, 58 (53.7%) were men; 63 (62.4%) lived with a partner; 71 (71%) lived in the inland of the state; 38 (41.3%) had incomplete primary education and 43 (45.7%) are retired. The mean age of the participants was 57.7 years, and the median family income was BRL 1.760.00.

Table 1 – Sociodemograwwphic characterization of patients with dry eye admitted to the Intensive Care Unit. Natal, RN, Brazil, 2016

Variables	n	%
Gender		
Male	58	53.7
Female	50	46.3
Marital status**		
Living with a partner	63	62.4
Not living with a partner	38	37.6
Place of birth**		
Inland of Rio Grande do Norte	71	71
Capital of Rio Grande do Norte	20	20
Others	09	9
Place of Residence **		
Inland of Rio Grande do Norte	55	54.4
Capital of Rio Grande do Norte	42	41.6
Others	04	4
Level of education**		
Incomplete elementary school	38	41.3
Complete primary education	18	19.6
Complete high school	12	13
Illiterate	12	13
Graduated	04	4.3
Incomplete higher	03	3.3
Unable to inform	03	3.3
Incomplete high school	02	2.2
Occupation**		
Retired	43	45.7
Paid work	32	34
Unpaid activity	09	9.6
Sick leave	05	5.3
Student	03	3.2
No activity	02	2.1
Religion**		
Practitioner	82	88.2
Non practitioner	11	11.8

	Mean	Standard deviation	Median	Maximum	Minimum	p value*
Idade	57.73	14.552	58	96	19	0.419
Renda familiar***	2,057.1	1.717.3	1760	8880	0	<0.001
Nº de dependentes familiares	3.31	1.622	3	9	0	<0.001

*Legend: * Shapiro-Wilk test **Missing data; ***Family income in BRL.

Regarding the clinical variables (Table 2), the most significant were hospitalizations for elective surgeries, with 55 (50.9%) patients, admission in the postoperative period, with 54 (50%) patients and length of hospital stay with a median of one day.

Table 2 – Clinical characterization of the types of hospitalization in the Intensive Care Unit. Natal, RN, Brazil, 2016

Variables	n	%
Type of admission		
Elective surgery	55	50.9
Surgical emergency / emergency	28	25,9
Clinical	25	23.2
TOTAL	**108**	**100**
Reason for hospitalization		
Postoperative	54	50
Heart Disorder	25	23.1
Shock	14	13
Pulmonary Disorder	12	11.1
Neurological Disorder	07	6.5
Infectious Disorder	06	5.6
Gastrointestinal Disorder	06	5.6
PCR	05	4.6
Renal Disorder	04	3.7
Hepatic encephalopathy	03	2.8
Electrolyte disturbance	02	1.9
Vascular disturbance	01	0.9
Metabolic Disorder	01	0.9
Neoplasia	01	0.9
HELLP syndrome	01	0.9
Type of surgery		
Not applicable	53	49.1
Abdominal surgery	19	17.6
Cardiac surgery	13	12
Coronary angioplasty	12	11.1
Neurological surgery	04	3.7
Invasive procedures (catheter placement)	03	2.8
Thoracic surgery	02	1.9
Renal surgery	01	0.9
Vascular surgery	01	0.9
Sector of origin **		
Surgery Center	36	33.3
Medical Clinic Unit	31	29
Hemodynamics	21	19.6
Another hospital	14	13.1
Surgical Clinic Unit	04	3.7
Outpatient	01	0.9

	Mean	Standard deviation	Median	Minimum	Maximum	P value*
Length of hospitalization (days)	3.30	4.21	1.00	1.00	26.00	<0.001

The data on comorbidities (Table 3) revealed that 61 (56.6%) patients in the sample had systemic arterial hypertension, followed by diabetes mellitus, in 29 (26.9%) patients and neoplasias in 28 (25 .9%) patients.

Table 3 – General comorbidities of patients with dry eye admitted to the Intensive Care Unit.. Natal, RN, Brazil, 2016

Variables	N	%
Systemic arterial hypertension	61	56.6
Diabetes mellitus	29	26.9
Neoplasms	28	25.9
Chronic Renal Insufficiency	23	21.3
Coronary diseases	15	13.9
Congestive heart failure	12	11.1
Respiratory diseases	11	10.2
Dyslipidemias	8	7.4
Stroke	7	6.5
Hepatopathies	7	6.5
Vascular diseases	6	5.6
Arrhythmias	5	4.6
Obesity	4	3.7
Autoimmune disease	4	3.7
Infectious diseases	4	3.7
Heart valve disease	3	2.8
Thyroid disease	3	2.8
Gout	2	1.9
Cataract	2	1.9
Benign prostatic hyperplasia	2	1.9
Neurological diseases	1	0.9
Hematologic diseases	1	0.9
Late postoperative	1	0.9
Kidney transplantation	1	0.9

Regarding the variables related to eye assessment, most patients had complete closure of the eyelid in the left and right eyes related to exposure keratopathy. Hyperemia (redness in the conjunctiva) concerns the presence of vasodilated blood vessels, classified according to their extent, number of dilated vessels and hyperemic area. Superficial hyperemia was detected in 44 (40.7%) right and 41 (38%) left eyes, and several other patients had severe hyperemia (Table 4).

Table 4 – Characterization of signs and clinical data and results of the Schirmer test in patients with ocular dryness admitted to the Intensive Care Unit. Natal, RN, Brazil, 2016. (continues)

Variables	N	n	%	%
Eye assessment- clinical signs	OD	OE	OD	OE
Exposure keratopathy				
Complete eyelid closure	84	80	77.8	74.1
1/3 lower cornea exposed	10	13	9.3	12
1/2 of exposed cornea	7	4	6.5	3.7
Conjunctiva exposed	7	6	6.5	5,6
Cornea completely exposed	0	5	0	4.6
Redness in the conjunctiva				
Superficial hyperemia	44	41	40.7	38
Dilated blood vessels in perilimbal conjunctival region	22	27	20.4	25
Dilation of blood vessels in the conjunctiva and part of the cornea				
Numerous dilated blood vessels scattered across the entire ocular surface	9	6	8.3	5.6
Not applicable				
Chemosis	8	8	7.4	7.4
Eyelid edema				
Lagophthalmos	25	26	23.1	24.1
Conjunctival hemorrhage	39	37	36.1	34.3
Proptosis	34	31	31.5	28.7
	25	24	23.1	22.2
	05	04	4.6	3.7
	05	03	4.6	2.8

Variables	Standard deviation	Median	Minimum	Maximum	P value*
Schirmer **RE**	5.17	3	1	25	p<0.001
Schirmer **LE**	4.29	4	1	23	p<0.001

Legend: RE: right eye; LE: left eye

● **DISCUSSION**

Abdominal surgeries were the most prevalent type of postoperative in the present study, which leads to the hypothesis that surgery is a predisposing factor to the occurrence of dry eye for two main reasons: first, because loss of volume reduces tear film production, and second, because of the use of general anesthesia.

General anesthesia causes depression of the central nervous system and, consequently, inhibition of motor and sensory reflexes[9]. The inhibition of these reflexes reduces blink reflex and the production of reflex tears in response to sudden irritation, preventing complete eyelid closure[10]. Based on these findings, it is believed that surgical procedures make the patient more predisposed to dry eye, due to the following factors: loss of volume related to the surgical procedure, use of anesthetics, reduced blink reflex and reduced production of reflex tears in response to irritation, leading to decreased production and increased evaporation of the tear film.

Regarding the length of stay (number of days) in ICU, a recent study showed that this factor is crucial for the onset of eye diseases, due to prolonged exposure to the risk factors of the referred environment. As these are critical patients who require specialized assistance, basic care such as eye care tends to be neglected. Moreover, these patients are exposed to factors such as mechanical ventilation, sedatives, multiple medications and air conditioning[10-11].

Of the comorbidities investigated, systemic arterial hypertension was the most frequent among the study patients. The literature reports the fact that the use of angiotensin-converting enzyme inhibitors may have impact on the onset of dry eye, because it interferes with the efficiency of the tear film[12].

Eye assessment revealed a slight difference between the RE and the LE regarding complete eyelid closure. Reduced blink frequency and incomplete eyelid closure may impair ocular surface integrity. Lagophthalmos associated with reduction in blink reflex favors a faster process of tear evaporation, which in turn reduces lubrication of the ocular surface, and significantly restricts the removal of microorganisms from the ocular surface[13].

The data collected in this study reveal a high prevalence of hyperemia in the patients, especially when all the classifications are added. It was estimated that 76.8% of the patients had hyperemia in the RE and 76% in the LE. Hyperemia, which is characterized by redness in the conjunctiva, results from vasodilation of conjunctival blood vessels, and is caused by the malfunctioning of specialized structures that maintain the lubrication on the ocular surface[3].

The data obtained showed that 36.1% of the patients had conjunctival edema (chemosis) in the RE and 34.3% in the LE. These data corroborate findings of another study with patients with similar characteristics that revealed the occurrence of chemosis in 37.07% of the patients[14].

Eyelid edema can be understood as the accumulation of fluid around the eyelid region, which may result in the impairment of the blinking reflex and incomplete eyelid closure. The referred study reported a significant occurrence of eyelid edema, with 31.5% in the RE and 28.7% in the LE of the patients, as well as an association suggested by the inferential statistics of the test for both eyes.

Schirmer test obtained median values of 3.00 for the RE and 4.00 for LE, which confirms the presence of dry eye, because the insufficient tear volume is an attribute that defines the presence of the phenomenon; The volumetric measurement may indicate reduction of tear production by hyposecretion of the lacrimal gland, as well as by increased evaporation, which causes tear film instability and subsequently dry eye when associated to at least one clinical sign or symptom[3].

One limitation of this study is the small sample size, as it was conducted in only one intensive care unit. Therefore, its results cannot be generalized to the target population. Moreover, because of the observational nature of this cross-sectional study, the establishment of causal relationships between exposure to the variables and the occurrence of dry eye has not been possible.

● **CONCLUSION**

The present study made it possible to observe the vulnerability of the patients admitted to the ICU of a given hospital to eye damage. Nursing professionals, responsible for the continuous care to this population, must implement actions targeted to eye health, in order to avoid damages that may compromise the quality of life of these patients.

knowledge of the clinical and sociodemographic characteristics of the patients with dry eye is essential to ensure an accurate nursing diagnosis, and hence an adequate planning of the nursing actions, aimed at the prevention and control of possible eye health problems.

Observational studies can characterize a given population and determine the factors responsible for the occurrence of a disease. They are an important auxiliary tool in the planning and adoption of strategies capable of preventing health problems, and may suggest important hypotheses to be tested. However, they have some limitations regarding data collection, because they only allow the observation of a representative subset of the study population at a specific point in time and because they cannot infer cause and effect.

The results obtained allowed us to formulate hypotheses and identify possibilities of associations between the variables. However, such hypotheses must be tested in further studies with different designs.

● **ACKNOWLEDGMENTS**

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