



Comparison of Nasolacrimal Duct Obstruction in Pre-Term and Full-Term Infants

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ABSTRACT

Congenital Nasolacrimal Duct Obstruction (CNLDO) is the condition in which a tear duct had not open at the time of birth. It is an obstruction of the lacrimal drainage system. In Infants, the majority of Nasolacrimal Duct Obstruction is congenital. As a result of which, there will be a continuous discharge. The obstruction occurs most commonly at the valve of Hasner, at the lateral end of the duct. It can be unilateral or bilateral. This condition is also known as Dacryostenosis. Congenital Nasolacrimal Duct Obstruction is present in 4-6% of normal newborn children. To determine the rate of Nasolacrimal Duct Obstruction in pre-term and full-term infants and the sticky discharge would be more in pre-term infants and watery discharge constitute the higher ratio in full-term infants. A comparative, observational study was conducted a Department of Paediatrics FMH College of Medicine & Dentistry, Shadman Lahore. It was six month study after the approval of synopsis from August 2017 to January 2018. Subjects were up to the age of one year. One Hundred Pre-Term and One Hundred Full-Term Infants was included in this study. A self-designed questionnaire was used to collect data. Regurgitation Test was used to detect obstruction below the lacrimal sac. 200 subjects were enrolled in the study to compare the incidence of congenital nasolacrimal duct obstruction in pre-term and full-term infants. Out of them, 100 subjects were pre-tem so as full-term. Out of 200 subjects, we have 121 males (60.5%) and 79 females (39.5%). The mean age of 200 subjects 56.5000 ± 92.27250 days. In this study, 100 pre-term and 100 full-term infants were examined using regurgitation test to determine the presence of congenital nasolacrimal duct obstruction. Out of 100 pre-term infants, 36 were found of having nasolacrimal duct obstruction as compared to 39 full-term infants. In terms of birth history and regurgitation test, Chi Square value was 0.192 and P value is 0.385, so the results were insignificant. Out of 36 positive pre-term cases, 12 subjects were having watery discharge and 24 were having sticky discharge in contrast with 39 positive full-term infants in which 22 were found of having watery discharge and 16 were having sticky discharge. In term of birth history and type of discharge Chi square value was 4.573 and P value was 0.102, so the results were insignificant. Congenital nasolacrimal duct obstruction is a common pediatric pathology seen in ophthalmology. This study reported a higher incidence of congenital nasolacrimal duct obstruction in full-term infants as compared to pre-term infants. This might be expected in the light of fact that pre-term infants kept in a clean and protective environment for a limited period of time as compared to full-term infants.

Keywords: Infants, Nasolacrimal duct, Congenital

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INTRODUCTION

Congenital nasolacrimal duct obstruction (CNLDO) is a common disorder in the pediatric population, causing failure in the nasolacrimal duct drainage system and presenting clinically in the overflow of tears, also called “epiphora” (Schnall, 2013).

Epidemiological studies report that the prevalence of CNLDO ranges from 5% to 20% in the early phase of childhood (Sevel, 1981, MacEwen & Young 1991). MacEwen et al. found that in a cohort of 4792 infants in Britain, the prevalence of epiphora was approximately 20% in the first year of life, and almost 95% of this population showed symptoms at one month of age (MacEwen & Young 1991). The pathogenesis of CNLDO lies in a mechanical obstruction located distally in the nasolacrimal duct (NLD) at the valve of Hasner, where this structure enters the nose (Petersen & Robb, 1978). Furthermore, most of the evidence would show the main causes of obstruction as either a pathological persistence of the membrane at the distal portion of the NLD, some bone abnormalities, or a stenosis of the inferior meatus leading to a narrowing in the lacrimal drainage system (Moscato et al., 2010). Moreover, the higher prevalence of CNLDO reported in premature infants compared with ones at full-term suggests the importance of the physiological development of the nasolacrimal drainage system during intrauterine life, in order to ensure the patency of the NLD (Lorena, et al., 2013).

The clinical presentation of the disease is mostly characterized by excessive tearing and ocular matting. Distal obstruction at the Hasner valve is more likely to cause a mucopurulent discharge, whereas, when obstruction is near the nasolacrimal sac, (valve of Rosenmueller), it is more frequently related to a watery discharge (Olitsky, 2014, Petris & Liu 2017). While usually unilateral, CNLDO occurs bilaterally in 20% of cases (Olitsky, 2014). The diagnosis of the disorder is confirmed by the fluorescein dye disappearance test, which evaluates the clearance of the dye from the tear meniscus in both eyes over a 5-minute period (Hornbliss & Ingis 1979). However, other causes of epiphora in infants, such as infantile glaucoma

and foreign body and corneal infections should be carefully ruled out (Swampillai & McMullan, 2012). While bacteria overgrowth can occur in patients with CNLDO, it is usually delimited in the NLD and only occasionally causes conjunctivitis (Kashkoui et al., 2010).

Congenital Nasolacrimal Duct Obstruction (CNLDO) was the condition in which a tear duct had not open at the time of birth. In Infants, the majority of Nasolacrimal Duct Obstruction was congenital. The obstruction was occur most commonly at the valve of Hasner, at the lateral end of the duct. It could be unilateral or bilateral (Katherine, & Lee, 2019). In normal around 5 to 20 % cases are diagnosed with nasolacrimal duct obstruction and covered without any surgery (Carisa et al., 2017). A regurgitation of fluid or pus in a watery or sticky eye on pressure over lacrimal sac confirmed the diagnosis (Nazaullah, 2006). Clinical features of the diseases are ocular matting and excessive tearing. Mucoplurulent discharge is occur due to distal obstruction at the Hasner valve. In contrast when there is excess watery discharge then there is obstruction near the nasolacrimal sac (Aldo et al., 2018).

There is the drainage of tears through the lower and upper punctum, superior and inferior canaliculus into the common canaliculus. The canaliculus drains into the lacrimal sac. The is the presence of a valve Rosen Muller within the junction between common canaliculus and lacrimal sac. This one way pathway through valve inhibits the reflux from the lacrimal sac to the puncta. The drainage from the lacrimal sac moves towards the nasolacrimal duct inferiorly and from there into the inferior meatus of nose. The meatus of nose is itself partially protected by mucosal fold which is known as valve of Hanser. The lacrimal passage of eye is consisted on bony passage and a membranous one. The bony passage is formed anteriorly by the frontal process of maxilla and by the lacrimal bone, posteriorly. The other one called the membranous lacrimal passage consists of lacrimal canaculus, the lacrimal sac, membranous lacrimal and a nasolacrimal duct (Shani et al., 2018).

The Blood Supply of the lacrimal gland was through ophthalmic artery and infraorbital branch of the maxillary artery and the lymphatic drainage was through preauricular Nodes. The nerve supply was through the ophthalmic division of the fifth nerve. Signs were sticky discharge or epiphora, regurgitation of mucopurulent discharge on the pressure over sac, pain, redness, swelling relatively, the symptoms were watering and sticky discharge. The test performed to confirm the diagnosis was regurgitation test. In this test, the pressure was applied over the lacrimal sac area with either thumb or index finger and observing the puncta. In case with Nasolacrimal Duct Obstruction, the contents of the sac were regurgitate through puncta. Regurgitation of any discharge was observed e.g. watery or sticky from the lower or upper punctum means +ve regurge test that indicated obstruction below the lacrimal sac. No discharge means - ve regurge test that indicated patent lacrimal passages (Jogi, 2009).

NLDO, progresses with bacterial infections. The normal stasis of fluid has some bacteria which flush through tears but in case of NLDO stasis of fluid is obstructed and warm environment is created which supports some bacteria to grow there. There are two forms of bacterial infections one is acute dacryocystitis and chronic dacryocystitis. In the case of acute dacryocystitis it appears during 1 to 2 weeks of birth neonates and causes severe degree of infection. It appears as swelling and erythema that overlying the lacrimal sac. In acute dacryocystitis infants may develop cellulitis and abscesses can be formed due to accumulation to purulent material in lacrimal sac. While in case of chronic NLDO, there is no proper external visible abnormality can be seen in children. The treatment of NLDC is first conservative, which includes the massage, warm compressors. The massage causes the hydrostatic pressure within the lacrimal sac and it opens the distal membrane. Topical antibiotics are used as secondary infection treatment (Adnan, 2018).

MATERIALS AND METHODS

Study Population:

Subjects included in this study were upto the age of one year.

Study Setting:

This study was conducted at the department of Paediatrics Fatima Medical Hospital College of Medicine & Dentistry, Shadman Lahore.

Study Design:

It was comparative, observational study.

Sample Size:

One hundred pre-term and one hundred full-term infants was included in this study. Another similar study was conducted at peri-peri health center from July 2004 to November 2009 and their sample size was about two hundred pre-term and two hundred full-term infants (Silvia Helena Tavares Lorena, et al, 2012).

Inclusive Criteria:

- i. Children upto one year of age were included in this study.
- ii. Pre-term infants.
- iii. Full-term infants.

Data Collection Instrument:

A self-designed questionnaire was used to collect data.

Operational Definition:

- i. Epiphora is the constant watering of the eyes due to blockage of the lacrimal ducts or the excessive secretion of tears.
- ii. An infant is typically applied to young children between the ages of one month and twelve months.
- iii. Pre-term infant is an infant whose gestational age is less than 37 weeks.
- iv. Full-term infant is an infant whose gestational age lasts between 37 to 42 weeks.

Methodology

Regurgitation test was used to detect obstruction below the lacrimal sac (mostly in NLD). Firstly, pressed just below the medial palpebral ligament (MPL) by the little finger or by a glass rod covered with a piece of cotton (anatomical site of lacrimal sac). MPL becomes more exposed by outward traction of the skin at the lateral canthus. It was better to

use the right little finger to the left sac and the reverse. Regurgitation of any discharge was observed e.g. watery or sticky from the lower or upper punctum means + ve regurge test that indicated obstruction below the lacrimal sac. No discharge means - ve regurge test that indicated patent lacrimal passages.

Ethical Issues:

There were no ethical issues in this study.

Statistical Data Analysis:

Data was entered and analyzed by using IBM-SPSS V-21[IBM Corp]. Continuous variable like age, weight were expressed as mean ± SD whereas categorical variables in the form of

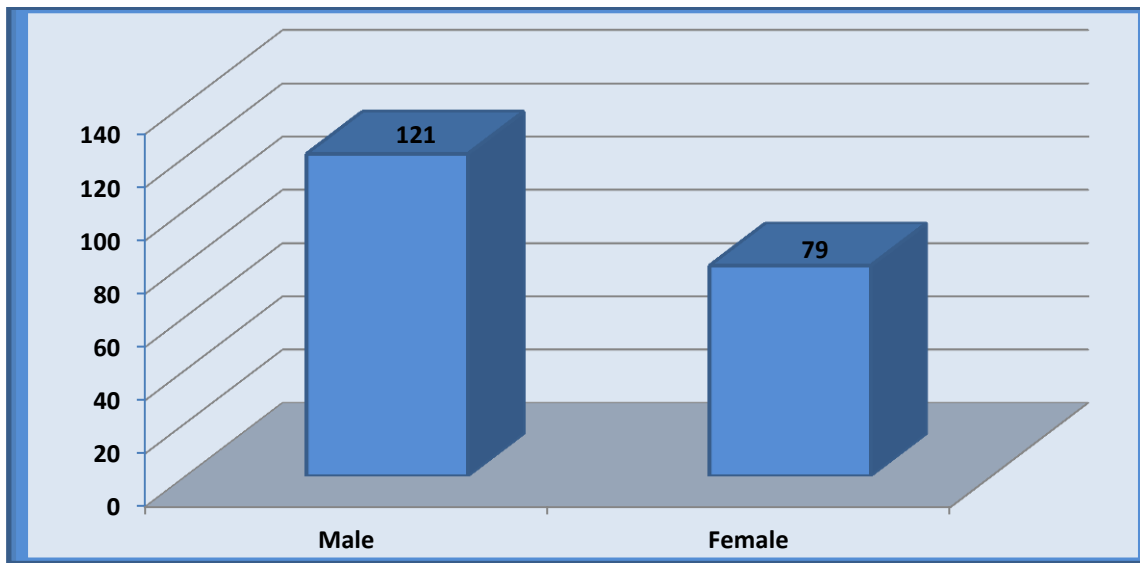
frequency and percentage. Charts were used to display the data.

RESULTS

200 subjects were enrolled in the study to compare the incidence of congenital nasolacrimal duct obstruction in pre-term and full-term infants. Out of them, 100 subjects were pre-tem so as full-term. Out of 200 subjects, we have 121 males (60.5%) and 79 females (39.5%) as shown in Table 1. The mean age of 200 Subjects 56.5000±92.27250 days (The minimum age 1 day and Maximum age 360 days) as shown in Table 2.

Table 1: Gender Distribution of Subjects

Gender	Frequency	Percentage
Male	121	60.5
Female	79	39.5



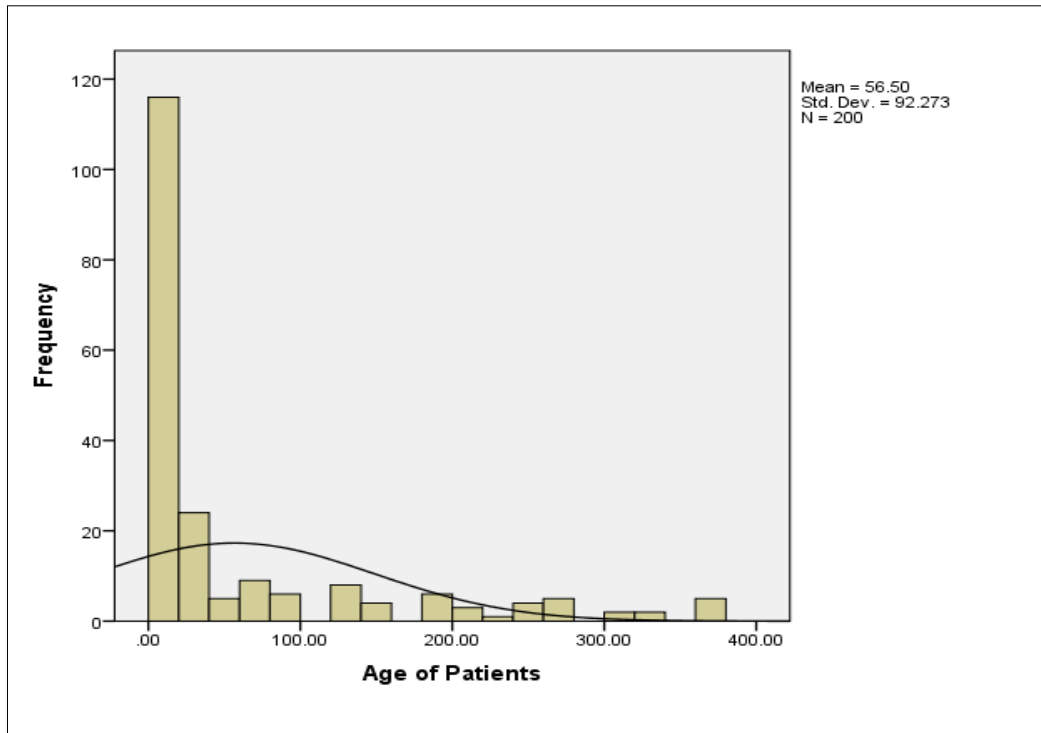
Graph No4.1: Gender distribution of subjects

Infant’s up to one year of age were included in this study, as it is a congenital anomaly. So Table 2 shows the age distribution of patients.

Table 2: Descriptive Statistics of Age

Number of Subjects	Mean	SD	Minimum	Maximum
200	56.5000	92.27250	1.00	360.00

The results of Table 4.2 shows that the mean age of congenital nasolacrimal obstruction patients is 56.50±92.273



Graph 2: Descriptive Analysis of Age

In this study, 100 pre-term and 100 full-term infants were examined using regurgitation test to determine the presence of congenital nasolacrimal duct obstruction. Out of 100 pre-

term infants, 36 were found of having nasolacrimal duct obstruction as compared to 39 full-term infants as shown in Table 3.

Table 3: Crosstab between birth history and regurgitation test

Cross tabulation between birth history and regurgitation test				
		Regurgitation Test		
Birth History		Negative	Positive	Total
	Pre term	64	36	100
	Full term	61	39	100
Total		125	75	200

Chi square value is 0.192 and P value is 0.385, so the results are insignificant. Out of 36 positive pre-term cases, 12 subjects were having watery discharge and 24 were having

sticky discharge in contrast with 39 positive full-term infants in which 22 were found of having watery discharge and 16 were having sticky discharge.

Table 4: Crosstab between Birth History and discharge type

Cross tabulation between Birth History and Type of discharge					
		Type of Discharge			
Birth History		No Discharge	Watery	Sticky	Total
	Preterm	64	12	24	100
	Full Term	62	22	16	100
Total		126	34	40	200

Chi square value 4.573 and P value is 0.102, so the results are insignificant.

DISCUSSION

Congenital Nasolacrimal Duct Obstruction (CNLDO) is a common disorder of the lacrimal system that causes watering and sticky discharge in pre-term and full-term infants with an incidence of 1.2% to 30%. Since the purpose of the study was to compare the nasolacrimal duct obstruction in pre-term and full-term infants, so 100 pre-term and 100 full-term infants were included in this study. Out of 200 patients, 121 (60.5%) were male 79 (39.5) female. These figures are comparable to the study done by Nazaullah Khan who reported that 52 (64.2%) of the cases were male and 29 (35.8) female (Nazaullah, 2006).

Silvia Helena from 2004 to 2009 conducted a comparative study and included subject's upto one year of age. The Nasolacrimal Duct Obstruction is a congenital anomaly that can be present at the time of birth so the patients included in the present study are infants from the age of 1 day to 360 days. The mean age of 200 patients was 56.5000 ± 92.27250 days (Silvia et al., 2012).

A study was performed by Nazaullah Khan in 2006 on 100 eyes of 81 children and concluded that children with CNLDO are relieved with conservative treatment and in the remaining unsuccessful cases probing is done. So the children were divided into two groups. In the first group out of 25 patients with 30 involved eyes, 83% were relieved of symptoms with conservative treatment. In the second group, out of 56 children with 70 involved eyes, 87 responded to probing. The success in both conservative treatment and probing was 97% (Nazaullah, 2006).

Congenital nasolacrimal duct obstruction is a condition in which a tear duct fails to open at the time of birth. The blockage occurs most commonly at the distal end of the duct at the level of valve of Hasner. It can be unilateral or bilateral. There are many symptoms of CNLDO like watering, mucopurulent and purulent discharge. Purulent or sticky discharge is most commonly found in dacryocystitis (the delayed stage of NLD blockage). Similar study was conducted by Ffooks in 1962 and reported 437 cases of

infantile dacryocystitis. As this study is on the nasolacrimal duct obstruction so out of 36 positive pre-term cases, 12 are having watery discharge and 24 patients have sticky discharge and in 39 positive full-term cases 22 patients have watery discharge and 16 patients have sticky discharge (Ffooks, 1962).

Regurgitation test is a diagnostic test for evaluation of congenital nasolacrimal duct obstruction. If on pressing the lacrimal sac, regurge of any discharge which may be watery or sticky indicates +ve regurgitation test which confirms any obstruction in the nasolacrimal pathway below the lacrimal sac. No discharge means –ve regurgitation test that indicates patent lacrimal passages. Out of 200 pre-term infants 32 (16%) are having nasolacrimal duct obstruction compared with the 7 (3.5%) of the 200 full-term infants in a study which has performed at the Peri-Peri Health Centre from July 2004 to November 2009 by Silvia. However, in the present study, out of 100 pre-term infants, 36 (36%) has CNLDO as compare to the 100 full-term infants (39%).

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