REVIEW OF LITERATURE

The disease dacryocystitis has been known from very early times, owing to its grosser manifestation involving abscess and fistulae on the face but was interpreted variously as a refluxion from the brain or a rotting of the naso-orbital bone.

First discovery of disease of lacrimal passage (dacryocystitis) is mentioned in the literature was done in the middle of the first century A.D. General term (\( \text{oegilops, a fistula} \)) oegilops, a fistula). Vasalins and Follopins described the lacrimal system with considerable accuracy.

In year 1702, George E. Stahl of Halle gave gross pathological manifestations of the lacrimal sac were shown to depend upon inflammation, not of the tissue generally but of the nasolacrimal canal, these manifestations taking any of three forms -

- Acute
- Chronic
- Hydrasis or ulceration with fistula.
The age is variable ranging from immediate postnatal period to fifth decade. Traquair (1941) described the maximum incidence at the age of round 50 years, while according to Duke Elder (1952) the incidence is maximum between the period of 40 - 60 years of age. Reddy et al (1955), Chaterjee (1955) and Agarwal (1961) found the highest incidence of the disease in the fifth decade.

Malik S.R.K. et al (1969) found that the highest incidence of age in female was in 4th decade average 35.9 years and range was 12 - 80 years. The average age in males was 23.8 years range 11 - 72 years. The highest incidence occurred in the late twenties.

Bale R.N. (1987) observed that the maximum incidence of age was over the age of 30 years nearly 78%. Among this the peak was at 5th decade of age 26%.

As regards the sex incidence it was found by all the observers that the disease is much more common in females. Traquair (1941) found 83% female and 17% male cases in his series while Skill (1949) observed
the male female ratio to be 30 : 70. Other observations like Duke Elder (1952), Chaterjee (1955) and Reddy et al (1955) found more or less the similar ratio.

Sex ratio was studied by Delgliesh (1967) also. He described that 7% of male and 20% of females gave history of one or more episodes of dacryocystitis in cases of nasolacrimal duct obstruction similarly the history of dacryocystitis combined with obstruction is present in 40% of males and 58% of females. He also described that 1/3 of patient shows bilateral condition 30% males and 32% females.

Malik S.R.K. et al (1969) studies in 169 cases of dacryocystitis and they found that the disease is 81.7% in female & 18.3% in male and in female average is 35.9% and male 23.8%. Bala Rajeev N. (1987) found male female ratio is 43 : 57.

Heinonal (1920) associated described about the high ratio of disease in female because of it with high nasal index (width / height x 100), while Meller (1929) mentioned that it is due to the narrower nasolacrimal canal in the females.
Regarding the socio-economic status Chaterjee (1955) and Reddy et al (1955) observed that the disease is more prevalent in poor patient (70%) probably due to unhygienic surroundings. Rosley S. and John (1967) reported that 75% common in poor class due to unhygienic condition and poor sanitation.

Veris (1955) observed that the disease was dominating in left side eye 66% over the right side 34%. The affection of side was found by Sood et al (1967) as 50% each right and left. While Malik S.R.K. et al (1969) studied 169 cases and found left side affection in 99 cases 59.8% and right side in 70 cases 41.2%. Bale Rajeev N. (1987) observed in 100 cases and he found the left eye affection 51.04% and right side was 48.96%.

Bilaterality observed by many authors i.e. Deglish (1967) found unilateral, bilateral ratio 66:34. Traquair (1941) observed 70:30. Malik S.R.K. (1969) found 74:26 and Bale R.N. (1987) studied 100 cases and found 57% unilateral and 43% bilateral.
Heredo - familial character of the disease has been noted by various observers like Schnyder (1920), Traquair (1941) and Jckson et al (1963) noted that it is transmitted as a dominant character in both males and females. Ferandez (1919) believed that narrowness of the nasolacrimmal canal is responsible for higher incidence of the disease in white races as compared to negros.

Some observers reported that the anatomical difference may cause the disease frequently. Onode (1913) observed that a spur on the anterior or posterior lacrimal crest or a well developed hamular process may constrict the lacrimal sac and may lead to frequency of disease. Baratta (1935) noted that the deformity of the nose and maxilla or fracture of the maxilla may completely block the nasal canal and lead to dacryocystitis.

Mechanical obstruction had been found in a large number of cases. Hypertrophied inferior turbinate bone had been observed by Post (1928) and Veris (1955).
Deviation of nasal septum was observed by Stenger (1916), Kaflar (1930) and Bockstein (1926), Traquair (1941) and Rutz (1972). They reported that deflection of nasal septum compress the structure against the lateral nasal wall and may result the obstruction of lower end of nasolacrimal duct.

Ruttin (1916) and Kefler (1930) found that even packing of the nose with guaze resulted in chronic dacryocystitis in same cases.

The allergic condition like chronic rhinosinusitis is also responsible for the dacryocystitis, both specifically and non specifically. In specific condition of chronic sinusitis the rhinoscleroma is one of the cause as reported by Badrwy R. (1962). He said that in the IIIrd stage of rhinoscleroma, the obstruction of lacrimal gland may occur. Darbri and Saxena (1961) study 42 cases of rhinoscleroma and they found obstruction of lacrimal gland in 24 cases.

The disease of the neighbouring structures bear an important role in the aetiology of the disease. The significance of nasal infection had been stressed by several authors Kuhut (1891), Galls (1904), Meyer (1909),
Peterson (1914), Robert (1954). On the other hand a number of observers disagree with this view and regard it as a coincidence and not due to the infection of neighbouring structures. Those authors were Bockstein (1926), Traquair (1941).

Rhinosporidiotis is common in agriculture communities in India and responsible for the dacryocystitis as reported by Kuriakose in 1963 and Purendre and Deoras in 1953.

Mukherjee et al (1928) in study of 414 cases of dacryocystitis during 2 years, got 48 cases of dacryocystitis due to rhinosporidiosis and in out of these 48 cases the sac (only) was involved in 42 cases and sac with nose in 6 cases. Walter, Straford and Havell in 1956 reported that the candidiasis also cause the obstruction of lacrimal duct due to candida albicans.
Jain H.R. and Sahai (1974) gave a report of ocular fungal infection in which the involvement of lacrimal sac is 24% and canaliculi is 4% caused by rhinosporidium seeberi which was first described by seeber (1900). He suggested that the disease is common in agriculture people.

David S.S. and Sivarama Subramanyam P. (1973) studied 21 cases of rhinosporidiosis and in which found 13 males and 8 females and 76.2% cases conjunctival involvement and in 28.6% cases lacrimal sac involvement. All the patients belong to agriculture community.

Susheela V. and Subramaniam (1975) noted that disease is common in agriculture people of India eg. W.Bengal, Bihar, Orissa, Maharashtra, Madhya Pradesh, Kerala etc. They studied in 49 cases of maximum age of 15 – 25 years and male – female ratio is 2%. In which he found seven cases of lacrimal sac involvement with lesion of nose also.

The infection of lacrimal sac may be due to spread of gross infection from local condition involving the conjunctival, nasal cavity and sinuses. It may also be due to systemic disease. Such as tuberculosis, leprosy, syphilis etc. as described by Traqueir (1941) and Anderson S.R. (1947).

It is also occurred by trachoma, eg. trachomatus dacryocystitis - extension of sub-nucous trachomatous infiltration from conjunctiva may involvement of the canaliculi and so sac may also affected. Charmis (1957), Postic (1957), Vali et al (1972), Dawson C.R. (1975) and Tabara et al (1980) and so many other.

Charles D. et al (1988) performed lacrimal sac biopsies and culture in 35 patients of nasolacrimal duct obstruction and found trachoma due to presumed chlamydial infection in 28 cases. In their opinion approximate 60% of patient of severe infective trachoma have either distal nasolacrimal duct or canalicular obstruction.

Dacryocystitis is secondary to tuberculosis infection commonly due to nasal origin in which direct
spread of nasal lump the usual cause indeed, weeping owing to a sec. dacrocyctitis not uncommon, described by Caboche (1907). He found 13 cases of lacrimal involvement duct of 24 cases of nasal disease.

Rollet (1911) and Kemler (1930) observed that nasal lump may cicatrize the lacrimal ostium and due to it dacrocyctitis is result.

Anderson and others in 1947 described that the secondary tuberculosis may give rise to the nasal infection and it affect the sac, then leading to dacrocyctitis. They studied 19 cases of tuberculosis infection of nose and found 4 cases of dacrocyctitis due to secondary to that.

Wearakoon in year 1969 found 14 cases of lacrimal obstruction among 247 cases of leprosy with ocular complication in Ceylon.

Wetzel (1945) reported that the tertiary stage of syphilis is also responsible for the disease.

The rare cause of lacrimal passage obstruction is granuloma of sarcoidosis as described by Neawlt and Roley in 1970.
Lacking of complete canalization is also responsible for the chronic dacryocystitis as reported by Cassady J.V. (1948), Jackson et al (1963) and Agarwal J.L. (1972).

Reddy et al (1955) stated that epiphora, depending on the severity of obstruction was the commonest and earliest symptom to begin with. They found epiphora in 80% cases. The regurgition of fluid on pressure was other most common finding observed by them in their series. Jones L.T. (1957) and Jacobs H.G. (1959) found epiphora in 94% cases.

Chronic infections of nose and throat with enlarged tonsils and adenoids were found to be the cause by many authors like Post (1928) and Gaynon I.E. (1962).

The infection may be specific like tuberculosis, syphilis, leprosy and rhinoscleroma or it may be non-specific. Atrophic rhinitis had been determinated in several cases, Heilmaier (1890) found atrophic rhinitis in 136 cases out of 352 cases of dacryocystitis.

The sinusitis also plays an important role as an aetiological factor of dacryocystitis as described by some observers like Kuhut (1914), and Garfin (1942). According to them the infection travels by veins or lymphatics by continuity of contiguity.
Other authors like West (1926) and Diggle (1927) disagreed with this hypothesis.

Conjunctival infections were thought to be other common and important source of disease but Duke Elder (1952) described that although they comprised an important but certainly a rare cause.

Some viral infections like traucoma, viral Kerato conjunctivitis and phlegetnular conjunctivitis are more common to spread the infection and responsible for dacrtyocystitis as described by Sanyal and Mitra (1967).

General infection have also been described as a rare cause of this disease. Few recorded cases and believed the infection to be blood borne. Thus Murgaillen and Morenon (1923) found dacrtyocystitis in influenza, diphtheria and small pox. Kofler (1928) believed that some of these cases are due to associated rhinitis. Infections from septic teeth had been observed by Kemler (1931). Sigelmen and Muller (1961) has described one case of tuberculosis of the sac.

Fungal infection of the lacrimal sac has also been described. Fine & Waring (1937) reported a case of dacrtyocystitis due to candida albicains. Toluaut (1941)
reported 23 cases of ocular spirotrichiasis of which one was of the lacrimal sac obstruction. Kosley et al (1967) reported one case of aspergillus of lacrimal sac. Actinomycosis infection was reported by Joseph T. et al (1980). Darbari and Saxena (1961) reported one case of seloroma. Ellis (1941) reported 25 cases of ocular rhinosporodiosis of which three were of the lacrimal sac involvement. Purandare and Deoras (1954) reported two similar cases.

Some cases of trachomatous dacryocystitis were also reported. Charmis (1957) discussed trachomatous involvement of lacrimal sac. Trachomatous infection of drainage system is common at puncta and less common in further downwards structure of lacrimal system. Histopathological changes of puncta, canaliculai and lacrimal sac are similar to those of conjunctival trachoma. Microscopic changes resulting from trachoma differs from those of dacryocystitis in general.

Dagglas J. Coster et al (1979) studied 23 cases of dacryocystitis due to canaliculi obstruction by Herpetic infection.
Robert F. Sanke et al (1982) found 3 cases of dacryocystitis due to chicken pox infection but all of unilateral. A dacryocystitis revealed obstruction of the common canaliculai in each case caused by a fibrotic scar followed by an attack of chicken pox.

Feruick C Riley (1969) observed the dacryocystitis is due to back's sarcoid. He suggested that due to it stains of the component of lacrimal sac resulted dacryocystitis.

A case of malignant melemomâ of lacrimal sac was reported in a 69 years old man complaining of epiphora and bleeding. A case of cercinoma of lacrimal sac has been reported and another of a papilloma of lower end of lacrimal canaliculai attached to the canaliculai by a single pedicle. Surprisingly the patency of drainage system was maintained in the later as shown radiographically that pedicle did not interfere with and mucopurulent plug. The relationship between infantile dacryocystitis and delayed formation of nasolacrimal duct was described by some authors like Kramer (1922), Cassady (1948), Duke Elder (1952) and Mann et al (1957) suggested that failure of rupture of nasolacrimal membrane at the lower end of duct which usually occurs at the time of birth may be the cause.
Agarwal V.L. and Gupta B.P. (1976) studies a series of 45 cases of dacryocystitis and found the stenosis, fibrosis of the sac or block mostly at the junction of sac and nasolacrimal duct.

Efooks (1959) and Jackson et al (1963) showed that in the most of the cases (50.75%) the membrane at the lower end of the nasolacrimal duct ruptures at the time of birth, so the incidence of inflammation of sac is less (0.5 - 5%).


The bacteriology of chronic dacryocystitis is of nasal type rather than conjunctival type eg. E.Coli, Pneumococci, Proteus, Pseudomonas. But the conjunctiva often shares the same flora as reported by Chaterjee in 1955, Sood Ratanraj and Balaraman (1967) and Traquair in 1941.
Staphylococci colonised in the nose of infants during first few days of life 64 - 100%. High incidence of conjunctival infection also recognised in infants. Pneumococcus was found to be the most common organisms (Duke Elder 1952). It occurred in pure form or associated with other bacteria and was seen both in acute as well as in chronic forms.

Other organisms which were found to be responsible by these authors were staphylococcus, streptococcus friedlander's bacillus, influenza bacillus, diplobacillus, E. Coli, bacillus fusiformis, typhosus, B., Koch's bacillus, B. retagenes, K.L. bacillus, Diphtheroids, proteusvulgaris, micrococcus catarrhalis and mycotic organism.

Rollet and Bussy (1923) studied 100 cases of dacryocystitis in which pure infection was found in 60 cases and mixed infection in 14 cases the remaining 26 cases being sterile. In mixed infection staphylococcus predominated.

Reddy and Reddy (1955) found 15% cases sterile in their series in which they found 52% pure infection and 33% mixed infection and staphylococcus was the common organism.
Ram and Prasad (1958) found 86 cases of pure (single) infection and 31 of mixed infection out of 136 cases and remaining 19 cases are sterile.

Warrants and Jonen (1969) studies in 109 cases and they found 58 pure infection and 34 mixed infection and remaining 17 was found sterile.

Gutierrez E.H. (1972) studied the 551 cases of positive culture in which he found 403 (73.14%) cases of pure infection and 148 (26.18%) cases of mixed infection. He also observed that staphylococcus aureus was the dominating organism present in 282 (51.00%) cases and involvement of streptococcus pneumoniae was only in 43 (8.0%) cases. Others organism he found i.e. Strep. hemolyticus, strept. viridans, Klebsiella etc.

Seal D.V., Barrelet S.P. and Mc Gill J.I. (1980) observed the bacteriology of the patient of dacrocystitis. They studied bacterial growth in 31 patient's eyes. They isolated the following pathogenic organism i.e. staphylococcus aureus, strept. pneumoniae and haemophilus influenzae were the main. Staphylococcus viridans was associated with conjunctivitis in patient aged under 1 year. Moraxella sp. was isolated on only one occasion.
Overall 40% of specimens were associated with staphylococcus epidermidis or mixed flora, which also occurred with culture of normal eye. Clostridium welchii was isolated on 3 occasion but was not associated with bullae or gas gangrene. The least overall resistance of 6% was to chloramphenical, but no one antibiotic was effective against all pathogene. They found pure infection of staphylococcus pneumoniae 10% haemophilus infection 3% and coliform sp. 3% and strept. viridans 4% and remaining 16% one sterile (no growth).

Bale Rajeev N. (1987) studies in 100 cases and did culture of 143 eyes in which he found pure infection in 71 cases and mixed infection in 21 cases and rest of 57 cases were found sterile. In which he found 24% involvement of staphylococcus and 17.94% involvement of D. pneumoniae.

Tumours and neoplasm of nasolacrimal duct and lacrimal sac have also been discussed by many authors Sexton (1970) recorded neoplasm of lacrimal sac which was epithelial in origin but others have also been described as of mesenchymal origin.
Seal et al (1981) studied the anaerobic bacterial growth examination of 27 eyes of dacryocystitis patient and found three are positive for *Clostridium perfringens* infection and all 27 cases of dacryocystitis had a similar flora of conjunctiva of the same.

Stanley J. cent (1963) observed that the heavy growth of *staphylococcus aureus* and pyogens in the cases of dacryocystitis along with acute leukemia patient.

The gross pathology had been described by Rollet and Busy (1923), they described the changes in the anatomical picture of lacrimal sac. The sac is usually shranken but may be dilated and due the folds of goblet cells, it may be obliterated and leading to obstruction.

Bomer M.C. (1931), Firde deantal (1964), Rahi A.H. (1967) and casanovas (1969), Agarwal L.P. (1970) described that the pathologically the inflammation of lacrimal sac passes through three stages -

1. The stage of infiltration and oedema (which may be considerable) leading to a blockage of canal.
(2). A stage of commencing fibrosis on accumulated exudate which can also be responsible for the blockage of the canal.

(3). Finally a stage of complete fibrosis. He observed that the -

"Obstruction of lower end of duct may be caused by the pressure of nasal polypi, hypertrophied inferior turbinate bone, extreme deviated nasal septum or by chronic rhinitis".

The pathology of chronic dacryocystitis is described by Rahi A.H. in 1967. He found that the size of the sac may varying from small selerotic ramment to huge dilated structure eg. large diverticula. In dilated sac, the walls of the sac are frequently twice or thrice of the normal size. So the mucosa is roughened and gablet cells are increased in number. The walls and mucosal folds are thickened and exaggreted thus the lumen is completely obliterated. Some time one or more structure may appear favourably at the lower end of sac.

Granston (1938) observed that the lacking of complete canalization of canicula is found to be responsible for the chronic dacryocystitis.
Pathological changes of trachomatous dacryocystitis is described by Gall and Iroson (1956) and Charmis J. (1957).

Gross nasal pathology described by the Planter also. It is known that inflammatory changes usually start and are more marked in the lower reaches of the lacrimal passages and it is probable that in a large number of cases their incidence is determined by the direct spread of infection from the nose. It seems equally probable, however, that nasal disease is not the sole factor in the aetiology of dacryocystitis, but that it usually requires a favourable soil for its extension. It can not by itself, for example explain social and sex incidence of dacryocystitis in or can it be regarded as invariably present.

Von Szilly A. (1920) described the pathology of the lacrimal passage as seen by roculgenography.

Malik S.R.K. and others (1969) studied 169 cases of chronic dacryocystitis and they found shallow constriction at the junction of the sac and the duct and indicated the location of the value of Krause. In 10.8% cases constriction in the calumn of contrast medium in naso-lacrimal duct seen. These were possibly due to mucosal
fields. In the other cases the value were absent and the duct looked like a smooth tube. In two cases small single diverticule were seen in the lateral wall of the duct. In one case the duct was tortuous.

Complete obstruction was found in 80% of cases and incomplete in 8.8%. In 11.2% there was no obstruction observed by Nahata (1964).

The commonest site of obstruction was the junction of the lacrimal sac and the nasolacrimal duct 53.2% and the next commonest site was the sinus major 24.3% of cases. Observed by Campbell (1964).

In female the lumen of lacrimal passage is narrower than male so dacryocystitis common in female, described by Rault and Laren B. in 1932.

First case of conjunctival infection was noted by Kirkpatrick in India and in 1961 he published the first case of lacrimal sac involvement due to that.

Following nasal pathology are involved in dacryocystitis -

- Hypertrophy of Inferior Turbinate bone - inlargement of flattening of the inferior turbinate bone which may almost obliterate the
anterior part of the meatus and may cause a local rhinitis implicating the opening of the duct. It was observed by Post (1928), Veris (1955) and others.

Extreme deviation of Nasal septum – extreme deflection of nasal septum may compress the inferior turbinate against the lateral wall of nose, so nasolacrimal duct of the same side to be compressed and dacryocystitis results as observed by Kefler (1930), Bockstein (1926) and others.

Packing of Nose – Kofler (1930) observed that due to long term packing of nose cause suppurtive dacryocystitis.

Congestive and hypertrophic condition of mucosa whether vasomotor or inflammatory may similarly cause a varied degree of obstruction at the lower end of canal observed by Traquair (1941) and Rutz et al (1966).

Inflammatory condition whether chronic nasal catarrh or the more acute and suppurative inflammmation may spread into the lower part of the duct and dacryocystitis results as observed by Duke elder (1952).
- Atrophic condition in the nose, frequently figure in the etiology particularly ozoena, the destruction of the mucosa leaving a patulous ostium not only permitting ready extension of the disease upward but allowing the direct entrance of infective secretion into the duct on blowing the nose, observed by Franceschetti (1935), Heilmaier (1959). They observed 136 cases of Atrophic Rhinitis among 352 cases of dacryocystitis.

- Sinus disease has undoubtedly a close relation with lacrimal inflammation. Here again some advocates of this particular source of infection have undoubtedly over stressed their case.

Many authors claimed that sinusitis and dacryocystitis co existed in too large a proportion of cases to be coincidental and that the later frequently cleaned upon the relief of the nasal condition observed by the Peters (1913) 50% of case of suppurative dacryocystitis with fistula, Kuhut (1914) found 68% cases of dacryocystitis certain and 23% of probable sinus disease. Brunzlow (1920) found 63.5% and 22% Cardar (1934) 46% and 35% probable, Gertin (1942) 55% certain.
It is probable that infection of (nose) spreads either by venous or lymphatic pathways by continuity lacunae in the lacrimal bone. Some times allow direct continuity between the ethmoid and the sac, the wall of the lacrimal fossa and the upper part of the duct being pneumatized by ethmoid cells, or the lacrimal bone, which is paper thin, becoming observed by age, carrier or pressure, which the pericystic tissue rich in lymphocytes and heavily vascularised from a readily traversible bridge between the two.

Stoloff and Gill (1986) observed that a slow growing facultative anaerobic gram - ve bacilli E. Corroden is also pathogenically responsible for the dacryocystitis of the human being. They studied 33 cases of Eikenella corroden infection is general hospital and in which they found one case of dacryocystitis due to same infection. Dua H.S. and others in 1988 also observed the infolvement of lacrimal passage by the same bacilli.
Bale R.N. (1987) studied in 100 patients and he found the various nasal pathology in all known cases of dacryocystitis.

- Inferior turbinate hypertrophy (ITH) - 3 cases of unilateral and 3 cases of bilateral
- Deviated nasal septum (DNS) - 6 cases unilateral and one bilateral
- Rhinitis - 2 unilateral and 4 bilateral
- DNS + ITH - 2 case unilateral 6 cases bilateral.

So in 100 patients the total involved eyes are 143 (by dacryocystitis) and out of them nasal pathology found in 41 eyes.