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# INCIDANCE OF TOXOPLASMOSIS AMONG BLOOD DONORS

## THESIS

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وَقُلْ اَعْمَلُوا فَسَيَرَى اللّٰهُ عَمَلَكُمْ وَرَسُولُهُ وَالْمُؤْمِنُونَ  
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# INTRODUCTION & AIM OF WORK

## INTRODUCTION AND AIM OF WORK

Toxoplasma gondii is ubiquitous and infects herbivorous, omnivorous, and carnivorous animals including mammals.

The natural mechanism of infection is by ingestion of cysts or oocysts or by transplacental transmission. Infection may also be acquired through blood transfusion, leucocytes transfusion, organ transplantation and laboratory accidents.

Toxoplasma gondii infection is a recognized complication in patients with a variety of immunodeficiency states also generalised toxoplasmosis in adult has usually been reported as a complication of immuno-suppressive therapy.

Organisms released from cysts or oocysts enter cells of the gastrointestinal tract, multiply, cause cell disruption and then infect neighbouring cells, extracellular organisms within leucocytes are transported throughout the body via blood stream and the lymphatic system and are capable of invading every organ and tissue.

The incidence of toxoplasmosis among blood donors was not heavily investigated if ever, and so it became the aim of this work.

# **REVIEW OF LITERATURE**

## TOXOPLASMA GONDII AND TOXOPLASMOSIS

- \* Historical introduction
- \* Definition of toxoplasmosis
- \* Epidemiology
  - Distribution and incidence rate
  - Age and sex incidence
  - Season and geographic differences
  - High risk people
  - Role of cats in infection
- \* The organism and life cycle .
- \* Transmission of *Toxoplasma gondii* .



## TOXOPLASMA GONDII AND TOXOPLASMOSIS

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### Histroical Introduction :

Toxoplasmosis is a world-wide infection of man and animals by the protozoon, *Toxoplasma gondii*. *Toxoplasma gondii*, the type species, was first described by Nicolle and Manceaux from the Institute Pasteur in Tunis in the year, 1908. The name is derived from the Greek *toxon*, meaning a bow or arc, connoting the lunate shape of the organism and the specific name *gondii* is derived from the name of the type host, "*Ctenodactylus gondii*", a small North African rodent, which was used as a laboratory animal at the Institute Pasteur.

The organism is generally believed to be a protozoon, reproduction is by multiple binary fission, proliferating organisms and pseudocysts may be distinguished. The first recognized in human in 1923 described by Janku, an ophthalmologist from Prague, it was that of an infant 11-months old with unilateral microphthalmus, bilateral chorioretinitis and parasitic cyst in the retina (Frenkel, 1949).

Toxoplasmosis was established human disease when a fatal case of infantile granulomatous encephalitis was reported and believed to be caused by a protozoon (Wolf and Cowen, 1941).

This was confirmed as being due to *Toxoplasma* when Sabin and Ruchman, 1942 investigated the characteristics of the toxoplasma neutralizing antibody in monkeys and human beings.

The real impact on medicine Came in 1948 when Sabin and Feldman discovered a serological test , the dye test , which enabled investigators to study the epidemiological aspect of the disease .

Definition of Toxoplasmosis :

Toxoplasmosis is a disease of man and animals of world-wide distribution caused by a small protozoon , *Toxoplasma gondii* , which may be transmitted to the fetus in utero by an infected mother or acquired in childhood or in adult life. Depending partly upon the age of the person when infected , they tend to be so grouped that four main clinical types of illness may be recognized :-

(1) Congenital Toxoplasmosis :

This form is characterised by encephalomyelitis , cerebral calcification , hydrocephalus and choroidoretinitis with symptoms either apparent at birth , or appearing soon afterwards .

(2) Acquired Toxoplasmosis :

- (a) Cerebrospinal : most frequent is children in whom the most typical manifestations are those of an acute meningo-encephalitis .
- (b) Lymphatic: characterised by the enlargement of one or more groups of lymph nodes , with at time fever of several weeks duration and marked constitutional disturbances .

- (c) Exanthematous: the form most frequently found in adults presenting as an acute febrile illness with wide-spread maculopapular rash , a diffuse interstitial pneumonitis , myocarditis , and at times meningo-encephalitis .
- (d) Latent: where infection by *Toxoplasma gondii* gives rise to no symptoms or signs of the disease , and diagnosis can only be made by means of laboratory tests. Latent infections are found only in adults and are probably acquired after the age of childhood ( Woodruff , 1978 ) .

*Toxoplasma gondii* is a ubiquitous parasite that occur with varying degrees of frequency indifferent geographic areas . It can parasitize any cell (except non-nucleated red cells " of warm-blooded animals and birds and persists for life of the host in an encysted form and most human infections are asymptomatic , but parasitemia occurs in all , If the host is pregnant during the letter , infection with death or disability follows in the fetus. The acquired form , when symptomatic , produces a variety of illness in which lymphadenopathy , myocarditis and encephalitis may predominate . The organism undoubtedly causes acquired posterior uveitis , Because live organism persists , *Toxoplasma* may again disseminate in hosts whose immunity mechanisms are injured by other diseases or therapeutic agents ( Feldman , 1968 ) .

Epidemiology :

Distribution and Incidence rate :

During the past decade *Toxoplasma gondii* emerged as a major pathogen of man the world-wide. In the United States as well as many other areas of the world, a large percentage of the human population is infected and in relation to the millions infected , the disease toxoplasmosis is relatively uncommon ( Remington and Krahenbuhl , 1982 ) .

Toxoplasmosis is a parasitic disease of great importance to public health , Each year more than 3,000 infants are born in the U.S.A. with congenital toxoplasmosis and many immuno-compromised persons with latent infections suffer lethal recurrences of toxoplasmosis infection ( Sacks , 1984 ) .

In the United Kingdom about 10% of persons have been infected and have toxoplasma antibody , by the age of 10 , 20% by the age of 20 , and approaching 50% by the age of 70 . The figures are similar in U.S.A , but in France there is much higher incidence about 80% of French people have been infected by the age of 20 years , this is probably due to the fact that for more raw or undercooked meat is consumed there ( Kwantes , 1984 ) .

Infection with *Toxoplasma gondii* exists in chronic asymptomatic form in approximately 50% of the population in the United States ( Krick and Remington , 1978 ) .

The incidence of the infection on human population has been determined by serological surveys which reveal the great frequency of infection in many countries . In certain tropical islands , such as Tahiti . Trinidad and Tristan du Cunha , the rate may be as high as 90% in people over 20 years of age , on the other hand , in some isolated groups , such as the inhabitants of the Oases in the New Valley of Egypt , amongst the Navajo Indian of the U.S.A. and in Iceland the incidence of infection is very low ( Woodruff , 1977 ) .

Most toxoplasma infection are unrecognized surveys have established that up to a third of the population in some areas of U.S.A. have antibodies to *Toxoplasma gondii* the absence of significant numbers of suspected or confirmed cases , in combination with this rate of seropositivity , indicates that toxoplasmosis is not an important recognized cause of morbidity , since toxoplasmosis is not a reportable disease , we are unaware of most of the cases that are diagnosed ( Krogstad , Juranek and Walls , 1972 ) .

#### Age Incidence :

The infection in older children and adults frequently goes unrecognized whereas the newborn infant may be severely damaged even when the infection of the fetus occurs after the fifth month of gestation ( Remington and Krahenbuhl , 1982 ) .

High rates of toxoplasma infection will be detected in children and there is increasing prevalence of serologic reactions indicating past exposure , with increasing age ( Feldman , 1968 ) .

Sex Incidence :

The sex distribution of toxoplasmic lymphadenopathy in Europe is interesting in childhood , boys are affected three times as commonly as girls but during adulthood women are affected three times as commonly as men ( Kwantes , 1984 ) . But there is little or no difference in Prevalence between the sexes in reports from the United States ( Remington, Jacobs and Kaufman , 1960 ) .

Season and Geodgraphic Diffenances :

Colder regions have less human infection than warmer areas -for example , Alaska and Northen Sweden have low rates , whereas Tahiti , Trinidad and other tropical islands or costal areas have high rates . Hot, dry areas or high areas have lower rates than warm moist regions-for example , the Mexican plateau has a lower rate than the coast-line and the Gutemalan high lands similarly show fewer positive tasts than the low lands ( Remington et al., 1960 ) .

High Risk people :

Toxoplasma infection is commonest in people with special habits. It is frequent in meat handlers of any sort , such as butchers , slaughters , house workers , skinners or laboratory workers using experimental animals , wounds on their hands become infected with the organism present in meat ( Woodruff, 1977 ) .

Vegetarians have been positive in serologic surveys both in England and in India , the prevalence rates in India , in Vegetarian Hindus and meat-eating Moslems , were very similar ( Remington et al., 1960 ) .

Incidence of toxoplasmosis was increased in multiply blood transfused patient with thalassemia major ( Siegel et al., 1971 ) and serological surveys throughout Africa among blood donors show variation in the prevalence of antibodies detected from 2% in a certain village in Ivory cost to 61% in a rural area of Somalia . Inspite of the paucity of clinical toxoplasmosis the incidence of antibodies among healthy blood donors was high 54% by indirect haemagglutination test and 42% by dye test ( Griffin and Williams , 1983 ) .

Homosexual men , parenteral drug abusers , Haitians and a few haemophilics have developed Kaposi's Sarcoma , severe opportunistic infections as pneumocystis carinii pneumonia and C.N.S. toxoplasmosis ( Wong, Gold , Brown , Lange , Fried , Grieco , Mildvan , Giron , Tapper , Lerner and Armstrong , 1984 ) .