CONGENITAL RUBELLA SYNDROME

ESSAY

SUBMITTED FOR PARTIAL FULFILMENT

OF MASTER DEGREE OF

(PEDIATRICS)

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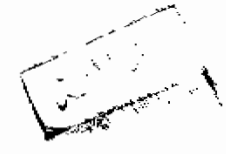


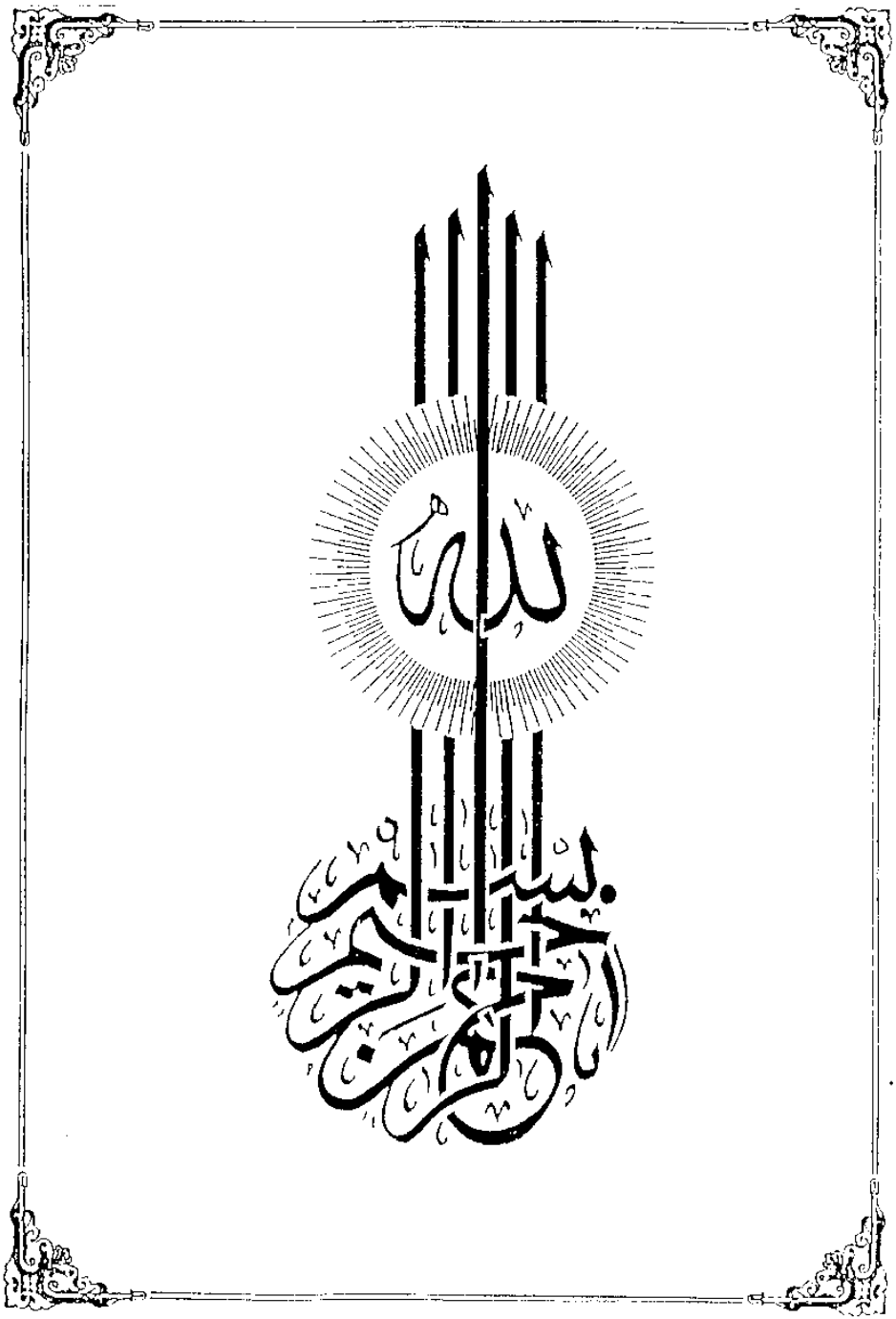
AIN SHAMS UNIVERSITY

1987

A K N O W L E D G E M E N T

I wish to express my deep gratitude to Professor Dr. KHALIL ABD EL HADY Professor of Pediatrics in Ain-Shams University for his Supervision and Continous encouragement during the progress of this work.

I would like to thank Dr. NANCY ABD EL AZIZ Lecturer of Pediatrics in Ain-Shams University for her kind cooperation and encouragement.



C O N T E N T S

A B B R E V A T I O N S

C R S	Congenital rubella syndrome
C D C	Centre for disease control
A G M K . . .	African Green Monkey Kidney
C P E . . .	Cytopathic Effect
H A I	Hemagglutination Inhibition
E L I S A . .	Enzyme-Linked Immuno - Sorbent Assay
F I A	Fluorescence immuno assay
P H A	Passive Hemagglutination
L A	Latex Agglutination
R.I A	Radio - immuno - assay
I S G	Immune Serum Globulin

INTRODUCTION AND AIM OF THE ESSAY

I N T R O D U C T I O N

Congenital rubella was identified as a clinical entity more than a century after the disease was first recognised. In 1941 Gregg reported the occurance of (congenital cataracts) among 78 infants born after materanal rubella infection acquired during the 1940 epidemic in Australia, more than half of these infants had congenital heart disease (Gregg, 1977).

Since 1941, Gregg's report of the rubella syndrome has been amply confirmed. The occurance of rubella during the firsttrimester of pregnancy has been associated with a significantly increased incidence of congenital malformations, still births and abortions. The epidemic of rubella in the united states in 1964 was followed by the birth of many thousands of infants with congenital rubella syndrome (Krugman's & Katz's, 1981).

Estimates of the risk of congenital rubella following maternal infection varry considerably among different studies. In general studies done before 1964 which included non epidemice periods tended to underestimate the risk, whereas early retrospective studies following epidemics resulted in high incidence values. Clearly, however, individual risk of congenital rubella depends upon the month of pregnancy in which maternal infection occurs (Forbes, 1969).

AIM OF THE ESSAY

The aim of our essay is to write a review about congenital rubella syndrome.

Our review will include:

* Etiology.
* Epidemiology.
* Pathogenesis and Pathology.
* Clinical Manifestations.
* Investigations.
* Prevention.

ETIOLOGY AND EPIDEMIOLOGY

ETIOLOGY

PROPERTIES OF THE VIRUS

Classification:

Rubella virus is placed in the rubivirus genus of the family Toga Viridae. At present it is the only species in this genus. The virus is physico-chemically similar to the other members of its family but it is serologically unrelated. Rubella virus has no invertebrate host and humans are the only known vertebrate host (Fenner, 1976).

Physical Properties:

The rubella virus is spherical with a diameter of 50 - 60 n.m. The viron surface is covered with 5 - 6 n.m. projections which are the hoemagglutinins. The nucleic acid of rubella virus is single-stranded RNA with a molecular weight of $3.2 - 3.8 \times 10^6$. The outer coat of the virus is lipoprotein in nature with host cell lipid and virus specified polypeptides (Sedwick, 1970).

Rubella virus is relatively sensetive to heat. It has generally been found to lose infectivity within 30 minutes at 56°C.

However (Kistler and Sapatino, 1972) have observed that some infectivity persists even after heating for 60 minutes at 70°C. At 37°C in the presence of 2%

serum 90% is inactivated in 3 hours. At 4°C with protein stabilisation viral titres are maintained for 7 or more days. The virus is stable at - 60°C and below but quite labile at normal (-10°C - 20°C) refregiration temperature (Kistler, 1972).

Rubella virus is sensetive to ultraviolet light. Rubella virus is also sensetive to visible light. The virus is also sensetive to pH extremes of less than 6.8 and more than 8.1 (Chagnon, 1964).

The following chemicals rapidly inactivate rubella virus. Ether, acetone, chlorophorm de-oxycholate, formalene, ethylene oxide, free chlorine and 70% alcohol. It is resistant to thimerosal (Plotkin, 1973).

Antigenic Composition:

Rubella virus infection of tissue culture cells results in the production of infectuous virus which can be neutralised by specific antiserum. Specific viral antigen can be identified by hoema-gglutenation, complement fixation, precipitation in gel, platelet aggregation and immunofluorescence (Salmi, 1972).

Tissue Culture Growth:

Rubella virus has been cultivated in a variety of tissue cultures. In general the virus produces interference (i.e. the multiplication of one virus in a cell usually inhibits the multiplication of another virus

entering subsequently) without cytopathic effect (i.e. the destructive changes of the cells caused by the virus in which it multiplies) in the following primary tissue culture cells: African green monkey kidney, bovine embryo kidney, guinea pig kidney, human amnion, human embryonic kidney. Interference without a cytopathic effect has been observed in rhesus monkey and human diploid cell lines (Krugman and word, 1977).

Animal Susceptibility:

Although natural infection is known to occur only in humans, several other primates have been infected experimentally. In addition to primates rabbits, hamsters, guinea pigs and suckling mice have been all infected with rubella virus (Alford, 1976).

EPIDEMIOLOGIC FACTORS

The incidence of congenital rubella is dependant on the immune status of women of child bearing age and the occurence of significant epidemics. In the united states approximately 15% to 20% of young women have no detectable rubella antibody. During 1964 epidemic, 3.6% of pregnant women had rubella, in contrast the infection rate was 0.1% to 0.2% during inter epidemic years (Sever 1967).

Congenital rubella is a contagious disease, the infected newborn infant may disseminate the virus to contacts for many months. This resevoir may provide a source for maintaining the virus in nature from year to year. The risk associated with rubella infection has been variously estimated. An evaluation of several prospective studies indicates that the risk of congenital malformations after maternal rubella may be as follows:

1. 50 % to 50 % during the first 4 weeks of gestation
2. 25 % during the first 5 to 8 weeks of gestation.
3. 8 % during the first 9 to 12 weeks of gestation.

The over all risk of malformations from rubella during the first trimester is approximaly 20%. There is a slight risk of deafness when rubella occurs during the thirteenth to sixteenth week. (Krugman and Ward, 1977).

After an out break of congenital rubella in Chicago 1978 an intensive survey of loc l health-care personnel and hospital records identified 31 infants with congenital rubella syndrome. Rubella virus was isolated from 11 infants, rubella lgM antibodies were demonstrated in seven infants, ten babies had persistant high rubella hemagglutination inhibition titres.

The incidence of congenital rubella syndrome in chicago between july 1978 and june 1979 was 48.9 per 100.000 live births.

Mothers of babies with congenital rubella syndrome frequently remembered a rash illness during pregnancy (56%), were unmarried (74%) and were primigravidas (64%). No mother had received rubella vaccine. Review of prenatal rubella hemagglutination inhbition testing and follow up immunization in one hospital showed that only eight (10.8%) of 47 seronegative women received rubella vaccine after delivery. This out break of congenital rubella syndrome, indicates that physicians need to place increased emphasis on detection and vaccination of susceptible adult women (Lamperecht et al., 1982).

Over a thousand women with confirmed rubella infection of different stages of pregnancy were followed up pros-pectively two thirds of the women were multiparous. Pregnancy continued in 40% and infants were followed

up after birth both clinically and serologically. The frequency of congenital infection after maternal rubella with a rash was more than 80% during the first 12 weeks of pregnancy, 54% at 13 - 14 weeks, and 25% at the end of second trimester. (During the second trimester the rate of infection declines rapidly possibly because at this stage the structure of the placenta becomes fully developed). The infection rate then raise again to reach high figure in the last month.

Follow-up was to 2 years of age the findings in infected children being compared with those children who had escaped infection. Rubella defects occured in all infants infected before the 11^{th} week (Principally congenital heart disease and deafness), and in 35% of those infected at 13-16 weeks (deafness alone). No defects attributable to rubella were found in 63 children infected after 16 weeks.

Continued surviliance of cases of confirmed rubella during pregnency is recommended as an additional way of monitoring the effect of rubella vaccination. (Miller et al., 1982).