

DETECTION OF RUBELLA ANTIBODIES IN
EGYPTIAN FEMALES IN THE CHILDBEARING AGE



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INTRODUCTION & AIM OF WORK

INTRODUCTION AND AIM OF THE WORK

Until recently, there have been long intervals between significant development in the history of rubella. In the eighteenth and early nineteenth centuries, the disease was lost somewhere between measles and scarlet fever. Not until 1881, at the International Congress of Medicine in London, was a Consensus reached that rubella is a distinct and specific entity (Forbes, 1969). Another sixty years passed before Sir Norman Gregg's remarkable discovery of the association of rubella in early pregnancy with characteristic congenital anomalies in the infant (Gregg, 1941). As a result of this observation, rubella was thrust from its position as a mild, inconsequential disease of childhood and became a major medical problem.

The next important landmark came 20 years later in 1962, with the isolation of the virus in tissue culture by Weller and Neva (1962) and by Parkman, Bueschner, and Artenstein (1962); this event was followed by the rapid evolution of serological and virological methods for studying the infection.

These events have had major consequences in documenting the epidemiology and pathogenesis of rubella, in establishing the chronic nature of the foetal infection, and most important , in making possible the development of vaccines for the control of the disease. In the course of this period of feverish activity in laboratories in many parts of the world, an extraordinary amount of new, and sometimes surprising information has been obtained. This has centered around the virus, its behaviour in individuals and population groups, and the unique complexities involved in the prevention of congenital rubella.

As with other diseases, an understanding of the epidemiological features of rubella helps to provide a key for prevention. Following recognition of the teratogenic potential of the virus, more attention has been given to accurately recording the cyclic occurrence of epidemics and the age specific and seasonal incidences (Ingalls, 1967), as well as to establishing the risk of foetal abnormality when infection occurs during pregnancy (Lundstrom, 1962).

The aim of this work is to carry out a serological survey for detection of rubella antibodies in Egyptian

women. Two groups were examined : a group of 300 pregnant women in different trimesters of pregnancy, and another group of 200 non pregnant women in the child bearing age. This survey gives an idea about prevalence of immunity in Egyptian women which is of special importance particularly during pregnancy to avoid the risk of foetal infection.

REVIEW OF LITERATURE

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HISTORICAL ASPECTS OF RUBELLA

The history of rubella encompasses a period of about 150 years. From the early 18th century, German descriptions of a new entity called Rotheln were viewed with slowly diminishing skepticism. The names of de Bergen (1947) and Jahn (1951) were prominently associated with the early descriptions of the disease.

In 1866, Veale reflected the growing acceptance of Rotheln or German measles as an epidemic entity in his paper in the Edinburgh Medical Journal. He described 30 cases and formally proposed the name rubella.

The broad characteristics of the disease, with the notable exception of joint pains were defined by the late 1930's and, in 1938, Hiro and Tasaka established its viral nature and transmissability by the injection of throat washings (Fornes, 1969).

The frequency of joint pains in natural rubella is a diagnostic feature, although generally described as an occasional complication. It has recently been assumed of importance in relation to the assessment of

vaccine side effects. Joint involvement commonly occurs in female adults late in the disease and consequently escapes medical observation (Simpson, 1940).

In 1941, Gregg shattered the previous belief that rubella is so benign. His observation of congenital defects in infants of mothers who had suffered rubella early in pregnancy supported his belief.

Although as an ophthalmologist, his attention was attracted by an epidemic of congenital cataracts, Gregg also noted the frequent association of congenital heart disease and the occurrence of haemorrhages, renal abnormality, and bicornuate uterus.

In 1943 and 1944, Swan et al confirmed Gregg's observations. However, universal acceptance was slow and the 19th century dissension about rubella recurred in the 20th century.

Anderson (1949) and Kragman et al (1963) confirmed the viral nature of the disease in the succeeding years by the transmission experiments in human volunteers, but their scope was handicapped by the inability to cultivate the virus.

Initial general optimism for successful prophylaxis with γ -globulin has, in both normal and high dosage, proved in practice over the years to be misplaced (McDonald, 1963; Green et al, 1965).

Despite the techniques devised by Enders and his colleagues in 1949, isolation of rubella virus was to be delayed until 1962.

The practice of quoting an average incidence of malformation over the first three or four months of pregnancy minimized high risks to the foetus in the first and second month of pregnancy (Bradford Hill et al., 1958).

Therapeutic abortion rates and the overdiagnosis of rubella appear to have initiated many studies of the risks of maternal rubella which have necessarily depended on the diagnoses made by a multitude of observers.

Long awaited, the isolation of rubella virus in culture became possible in 1962 when, at about the same time, two groups, Parkman et al and Weller and Neva published their techniques. These findings initiated another dramatic change, this time in the scope and refinement of rubella research.

More fundamental information on infective processes in the foetus (Dudgeon et al., 1964) observations on foetal and infant immunological responses (Alford, 1965), the persistence of the virus until after birth (Cooper, 1967), and recognition of previously unsuspected rubella syndromes in the newborn were reported. It was found that rubella had by passed the concept of immunological tolerance (Forbes et al., 1969).

In 1965, Green and his colleagues published important observations on experimental rubella in children which sharply defined certain aspects and resolved some pre-existing contentions. Briefly, the studies showed that preexisting neutralizing antibody indicated a solid immunity, and that infection of susceptible individuals was possible both by injecting cultured virus and by pharyngeal spraying. Intramuscular injection of susceptible subjects was followed certainly by active infection unlike pharyngeal spraying in which infection failed in a proportion of cases. The subclinical infection rate was about 25%, and the period of infectivity was shown to be longer than had previously been anticipated. These experiments also finally removed for many, residual illusions about the efficacy of γ -globulin in the prevention of rubella infection.

The introduction of the hemagglutination-inhibition antibody test in 1967 by Steward enabled rapid and reliable assessment of immunity and was an important advance. This has ameliorated the situation for those women who have circulating antibodies, but the problems persist for the sizeable minority of women who are still susceptible. This test, too, facilitates rapid confirmation of diagnosis during the 10 to 12 day period after the rash when rising antibody titers may be detected.

Novel public health problems have arisen in relation to this mild disease. The persistent excretion of virus after birth by "rubella infants" creates specific problems, enhancing spread in obstetrical units and doctors waiting rooms to pregnant women (Schiff and Dine, 1965).

Not least has been and still is the anxiety generated by each successive epidemic of rubella. Medico-legal and religious difficulties associated with therapeutic abortion and contraception are major facets of the rubella problem which can only be fully overcome by the use, early in life, of an efficient vaccine. Perhaps this will not receive universal acclaim as undoubtedly rubella has been the convenient scapegoat to terminate the embarrassment of many social resalliances (Forbes, 1969).

CHARACTERISTICS OF RUBELLA VIRUS

Several years of effort were required before the virus could be grown to sufficiently high titers so that purified preparations could be obtained, and the agent could be characterized. In electron micrographs of thin sections of infected cells, the virions are seen as spherical enveloped particles measuring 70nm in diameter and containing electron dense cores that are 35 nm in diameter (Murphy et al, 1968). Negatively stained preparations of cell-free virus contain particles that are 70-75 nm in diameter, irregular in shape though roughly spherical and appear to have roughened surfaces suggesting the presence of projections (Liebhaber et al, 1969).

Rubella virus contains RNA and protein, while the presence of lipid is inferred from the buoyant density of the particle, which is 1.18g/ml, and from its sensitivity to lipid solvents (Liebhaber et al, 1969). The RNA which has been extracted has been shown to be infectious and is estimated to have a molecular weight of 3×10^6 daltons (Sedwick & Sokol, 1970). This would provide sufficient genetic information for 20 virus-specified proteins, each containing an average of 150 amino-acid residues.