

Rubella Seroprevalence in the Singapore Armed Forces (SAF) and the Changing Need of the SAF Rubella Immunisation Programme

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Abstract

A seroepidemiological study on the prevalence of rubella antibodies in a cohort of Singapore Armed Forces (SAF) recruits was conducted in 1994, twelve years after rubella immunisation was routinely given to primary 6 school boys in 1982. The results showed a high level of immunity (97.1% seropositive) in the study cohort. The implication of this finding is that it may no longer be necessary to routinely immunise recruits on entry into the SAF against rubella; the latter can be limited to those with no evidence of prior rubella immunisation.

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Introduction

Rubella or "german measles", is caused by an RNA virus and spread via droplet transmission. In children and adults it often runs a mild, self-limiting clinical course and complications are rare. However, the danger of the disease lies in its transmission to pregnant women when it can cause severe malformations in the developing fetus (congenital rubella syndrome).

Historically, outbreaks of rubella epidemics in Singapore have on occasion started among national servicemen and soon spread from the army camps to the rest of the population.¹ Frequent outbreaks of rubella among recruits also resulted in loss of training time. In 1976, Singapore embarked on a nationwide rubella immunisation programme for girls at primary 6 (about age 12). In 1982, this was extended to include both boys and girls at primary 6. In the same year (1982), a decision was also taken to routinely vaccinate all recruits against rubella.² This was successful in bringing the disease under control in army camps.

Figure 1 shows the incidence trend of rubella both in the SAF and in Singapore. There have been no outbreaks of rubella in the SAF since 1984.³ From 1985 onwards, there were only isolated cases of rubella recorded in the SAF. These were mainly in those who were enlisted before 1982.

In theory, the first batch of school boys immunised against rubella under the School Health Programme

would have entered national service in 1988. However, a serosurvey carried out in 1988 to study the seroprevalence rate of rubella in this cohort revealed that a significant 37% were still seronegative. A possible explanation could be that the coverage for the 1982 batch may not have been complete. Another reason could be that the cohort entering national service in 1988 was not entirely made up of the 1982 batch but included primary 6 cohorts earlier than 1982.

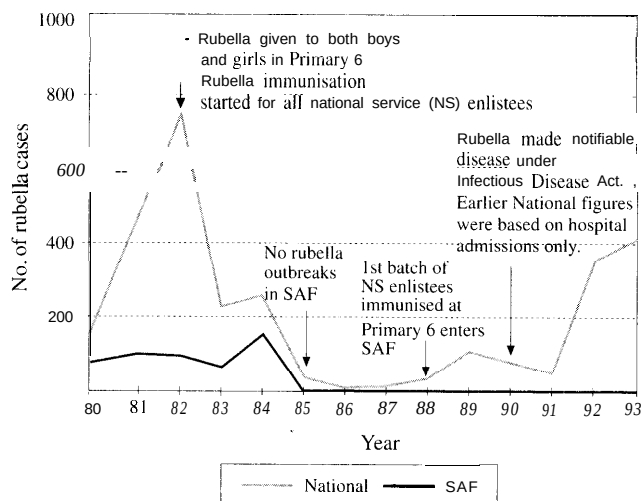


Fig. 1. Incidence of rubella: National and SAF trends since 1980

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The objective of the present study was to determine the persistence of rubella antibodies in the cohort of national service recruits in 1994, the majority of whom would have been covered under the nationwide rubella immunisation programme for primary 6 school boys started in 1982. The study, besides yielding information on the coverage (based on history) and effectiveness (based on seropositivity) of the immunisation previously received, would have implications on the changing need for immunisation of national servicemen against rubella on enlistment.

Materials and Methods

Two hundred and fifty recruits were randomly selected from among the July 1994 intake of recruits undergoing Basic Military Training (BMT) at the SAF's Third Brigade Training School. The sampling ratio was 1:20. Blood samples were obtained from 239 recruits (majority aged 18) who turned up at an appointed time. The remaining 11 were unavailable for various reasons and were excluded from the study.

The 239 subjects were asked to complete a self-administered questionnaire. They were first briefed by a medical officer who was present to clarify any doubts. The questions asked included whether they were previously vaccinated against rubella and if so, whether they had documentary proof of vaccination. They were also asked if they had previously been diagnosed to have rubella by a doctor and if so, at what age. This was later checked against their medical records—it is routine for all enlistees to be notified by post to produce their rubella immunisation certificates, if any; on the day of enlistment for national service. Blood samples (10 ml) were then taken and despatched to the Pathology Laboratory of Singapore General Hospital on the same day.

Testing for rubella IgG was carried out using the enzyme immunoassay (EIA) method. Samples having an antibody titre of >15 IU/ml were considered positive and protective.

Results

From the questionnaire, a total of 142 (59.4%) out of the 239 recruits were able to recall a history of previous rubella immunisation at primary six. Of these, 134 (94.4%) were able to produce supporting documents (Fig. 2). Three gave a history of rubella infection.

The remaining 94 (39.3%) out of the 239 recruits indicated they either did not have or were unsure of their immunisation status (Fig. 2).

The results of the serological testing of the 239 recruits are summarised in Table 1. The results showed an overall rubella seroprevalence rate of 97.1% (inclusive of one recruit with low levels) in this cohort.

From Figure 2, it can be seen that all the recruits who

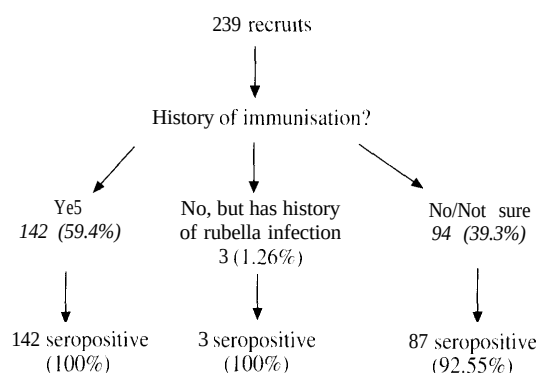


Fig. 2. Results of serological testing

TABLE 1: SEROPREVALENCE OF RUBELLA IgG ANTIBODIES IN A COHORT OF 239 RECRUITS

Seroprevalence	Number (%)
Positive (>15 IU/ml)	231 (96.7%)
Positive but low levels (<15 IU/ml)	1 (0.4%)
Negative	7 (2.9%)

had definite history of rubella immunisation were seropositive. The three recruits who had no immunisation but gave a history of rubella infection were all seropositive. Of the remaining 94 recruits who were either not sure or thought they did not have the vaccination previously, 87 proved to be seropositive (92.55%).

Discussion

Follow-up studies of post vaccination antibodies for rubella over time have shown that antibodies persist for at least 10 to 16 years, with less than 0.5% per year reverting to low antibody titre.^{4,5} The Ministry of Health's School Health Service had reported an average rubella immunisation coverage of 94.3% between 1985 and 1987—when the servicemen in our study cohort would have been in primary six (unpublished data). Our results, which showed that 97.1% of the study group were seropositive against rubella, are consistent with the reported good coverage at the primary 6 school stage. They also indicate a satisfactory level of seroconversion had taken place after immunisation, and that the antibodies had persisted. Of the 134 with documentary proof of previous vaccination, none were found to be seronegative whilst one (0.74%) was found to have low antibody titres (<15 IU/ml).

The critical vaccination coverage needed to block transmission of rubella has been estimated to be 85 to 87 per cent.⁶ Assuming an overall seropositive rate of 97.1%, there appears to be little risk of a major rubella outbreak in SAF camps today.

In our study, 39.3% were unable to produce documentary proof or were unsure of their rubella immunisation status. This shows that we cannot rely very much

on recruits producing documentary proof of their immunisation status. Prebult et al⁷ have shown that undocumented histories, regardless of the source, are of little value in predicting susceptibility to measles and rubella.

Fortunately, the situation in Singapore is likely to improve. Since 1986, all primary one students have been issued with a School Health Booklet which records all vaccinations given from infancy to secondary four. And since 1990, the School Health Service has computerised its immunisation records for all school children. Therefore the reliability of vaccination records of national service enlistees, beginning with the 1996 cohort, could be expected to improve. Indeed the possibility now exists for useful medical information to be transferred from the School Health Service's computer records into the SAF's computerised medical records. Recruits on entering national service will then have their immunisation status much more reliably established.

The high seropositive prevalence rate of 97.1% among national service recruits indicates persistence of a high level of immunity following successful coverage by the School Health Immunisation Programme. This means

that rubella immunisation on entry into the SAF can now be safely limited to those with no clear proof of previous immunisation. This will in turn translate into savings in vaccine costs (currently at S\$14,000 annually), savings in manpower, as well as avoidance of unnecessary needle-point pain on the part of the enlistees.

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