ROLE OF THE ENTEROVIRUSES ON THE EFFICACY OF POLIOMYELITIS VACCINATION IN EGYPT

THESIS

Submitted for the Partial Fulfilment of the Degree of M.D. in Pediatrics.....Ain Shams University

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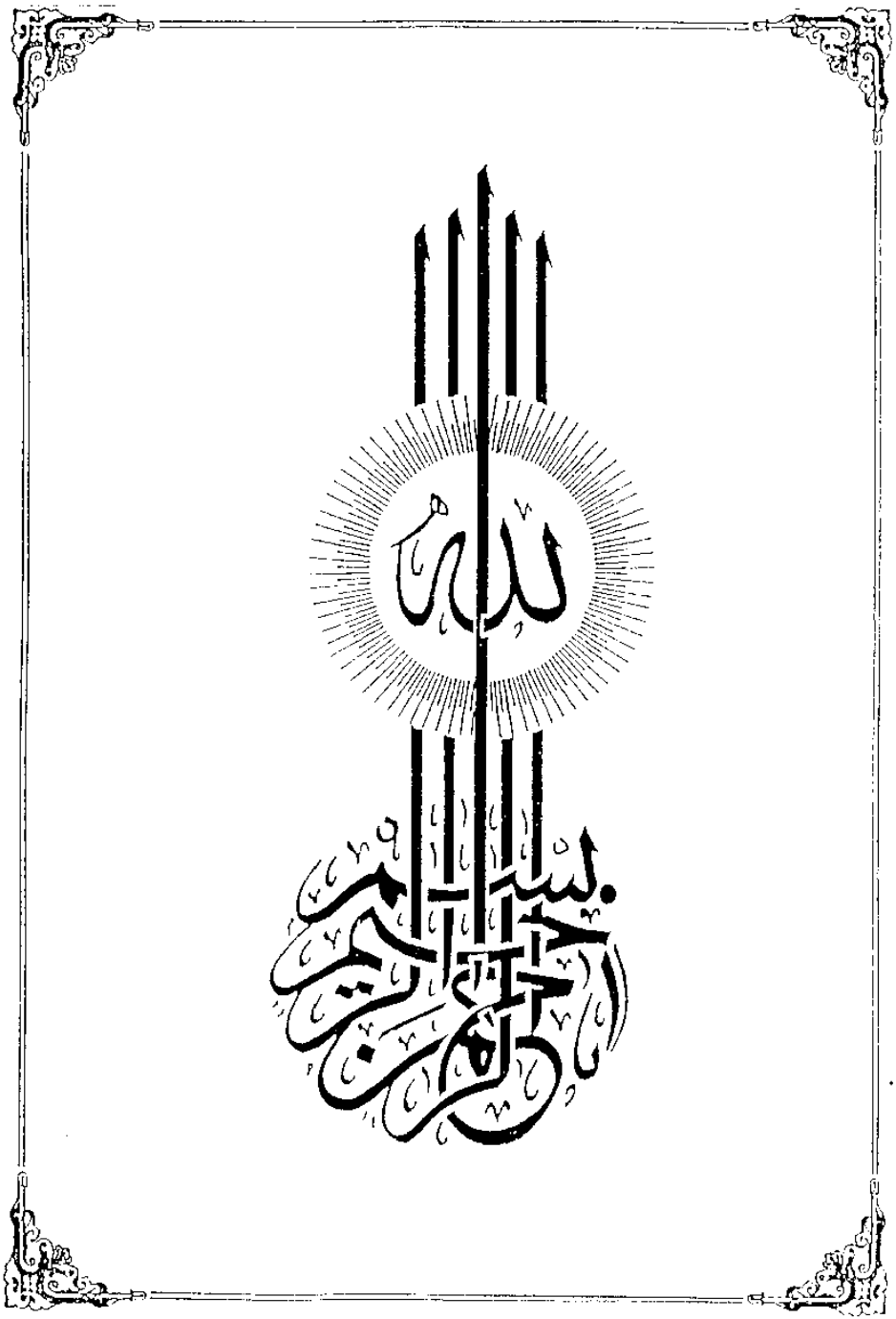
FACULTY OF MEDICINE.....AIN SHAMS UNIVERSITY

1984

ACKNOWLEDGMENTS



ACKNOWLEDGMENTS

I wish to express my sincere gratitude to Prof. Dr. Omar Helmy, Chairman of the Department of Pediatrics, Ain Shams University, for his continuous encouragement and help throughout this study.

I am also indebted to Professor Dr.Khalil Abdel Hady for offering me so much of his time and valuable advice throughout this work.

I owe so much to Dr;Imam Zaghloul for suggesting this study, for supplying help, guidance and laboratory equipment. Without his support this study could not have been carried out.

I am sincerely grateful to Dr.Rifky El-Karamany for his faithful help, guidance and effort throughout the practical work. His valuable assistance in interpretation of the results was indispensable.

I greatly appreciate the help of the members of the Virology Department of the Egyptian Organization for Biological Products and Vaccines and also Mr. El-Kamah, Chief Librarian who offered me all the available facilities and literature to accomplish this study.

To my husband Dr. Mahmoud Samy I am so grateful. He kept no effort, help or support from me throughout this study.

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One of the greater achievements of mankind is the great success of eradication of smallpox in the world using strategically a vaccine developed for individual protection to dislodge a virulent virus from its centuries old ecological niche in which it had maintained itself so successfully since the dawn of history of mankind.

In Egypt, eradication of smallpox has followed the paces of all the world. Unfortunately, this is not the same with poliomyelitis.

The varying paralytic consequences have made poliomyelitis a human disease of increasing importance during different decades of the twentieth century in different parts of the world. It has undoubtedly received much attention from epidemiologists. Yet, in spite of the intensive study over a century, many of the salient epid-

emiological features of this infection must still be considered enigmas. Even some of the accepted dogmas about poliomyelitis can be debated as erroneous.

According to WHO surveillance, poliomyelitis still remains a very serious problem in a large part of the developing world, Egypt among which, and still represents a constant threat to the childhood population (WHO, 1979).

Control of poliomyelitis, an incapacitating and handicapping disease and even its total eradication has been achieved in countries using either live (Sabin) or killed (Salk) poliomyelitis vaccine. Both vaccines have demonstrated their safety and efficacy (Melnick, 1978).

Countries which have been able to set up and sustain effective immunization programs, whether using the live or killed poliomyelitis vaccines, have succeeded in dramatically reducing to zero or near zero the incidence of paralytic poliomyelitis (Assaad, 1981). However, there are special epidemiological and other problems

connected with the prevention of paralytic poliomyelitis in developing countries by vaccination. This indicates why the highly effective vaccination schedules of the developed countries can at best have only a limited effectiveness in developing countries.

The countries which have used killed vaccine exclusively with a considerable degree of success have been small countries with excellent health delivery systems, with wide coverage, and reaching ninety percent or more of the target population (Rhodes & Van Rooyen, 1968). Sweden for example, was amongst the highest in the world as regards the morbidity rate of poliomyelitis prior to large scale vaccinations (Böttiger, 1981). Poliomyelitis vaccination since 1958 in Sweden using killed vaccine has been most successful and has conferred one hundred percent protection. Finland has also relied entirely on killed poliomyelitis vaccine since 1960. The last cases of indigenous poliomyelitis in Finland occurred in 1961 (Lapinleimu & Stenvik, 1981).

In these countries, where only killed vaccine was used for immunization, circulation of wild viruses of the three types of poliomyelitis has disappeared. Only after re-introduction of wild viruses in non-vaccinated religious groups, small epidemics have occurred which were limited to non-immunized members of such groups. The fact that the cases occurred in the non-vaccinated groups emphasized the success of vaccination using the killed poliomyelitis vaccine.

Oral poliomyelitis vaccine has also eliminated paralytic poliomyelitis in many temperate-climate countries in which a large proportion of children remain unvaccinated or incompletely vaccinated (Sabin, 1980). The live virus vaccine has been used in large countries like China, USSR, USA and many of the countries of Europe, with a combined population of two billion people. In these countries, poliomyelitis is being controlled very successfully and is reaching a vanishing or near vanishing point (Assaad, 1981).

Comparing the fact that in these countries after the mass application of oral Sabin vaccine since 1960 poliomyelitis was controlled to the extent of eradication, and the situation in some tropical and subtropical countries like our country, live poliomyelitis vaccine has been found to be less effective in inducing antibodies and immunity in children compared to those residing in temperate climates (Cockburn & Drozdov 1970; John & Jaybal, 1972).

The lower rate of vaccine " takes " has been ascribed to various factors. The defect was not in the vaccine itself as repeated field trials under strict supervision showed. By giving the proper vaccine to the correct child at the proper time, the resulting seroconversion could reach up to ninety five percent (Imam, 1981).

The lower rate of vaccine " takes " has been attributed to factors such as breast milk antibodies, cellular resistance in the intestinal tract owing to previous exposure to naturally circulating polioviruses or a substance in the

saliva of infants in these areas that inhibits the multiplication of vaccine virus (Cockburn& Drozdo 1970; Dömok, 1974). Interference by other enteroviruses has also been a factor suggested to affect the efficacy of the oral poliomyelitis vaccination in Egypt (Melnick, 1981).

The question now is: Why can the highly effective vaccination schedules of the developed countries of the world, at best, have only a limited effectiveness in the developing countries? And after reaching an answer to this question, should this low response to oral vaccine, regardless of the reason, be overcome by proper and continuous use of live vaccine, or should this strategy be revised ?

Some authors (Imam, 1983; Melnick, 1981) have suggested that in Egypt and such regions where multiple doses of live vaccine have not succeeded in overcoming the problem of such a crippling disease as poliomyelitis and in providing adequate immunity for infants, a plan for inoculating killed virus vaccine in a combined

program along with the live vaccine should be considered.
