

Abstract

Background: In 1988 the World Health Organization (WHO) proposed mass immunization campaigns with the trivalent oral polio vaccine (TOPV) among children less than 5 years of age. The Vaccine Vial Monitor (VVM) is a small patch of heat-sensitive material placed on the vaccine vial to register cumulative heat exposure. A direct relationship exists between the rate at which the VVM changes colour and ambient temperature. This in turn affects the potency of the oral polio vaccine. ^[1]

Objectives: To evaluate the status of the cold chain infrastructure in Kenya and to determine the total TOPV virus concentration of retrieved field samples.

Methods & Materials: A stratified multi-stage sampling strategy was used leading to selection of 14 health centres this study. A total of 23 TOPV vial samples were collected, separated into individual serotypes generating 69 samples for the potency test. Potency of oral polio vaccine was tested using Karber's formula. This was then compared to the Vaccine Vial Monitor stage of the vials

Results: Our study showed that the average potency of polio vaccine serotype 1, serotype 2 and serotype 3 were as follows;

Comparison between VVM1/VVM 2 and Serotype titres calculated

Polio 1 standard (Mean titre)	Polio 1 Test (Calculated Mean Titre)	Polio 2 standard (Mean titre)	Polio 2 test (Calculated mean Titre)	Polio 3 Standard (Mean titre)	Polio 3 test (Calculated mean Titre)	VVM
10^6	$10^{6.05}$	10^5	$10^{4.98}$	$10^{5.5}$	$10^{5.73}$	1
10^6	$10^{6.03}$	10^5	$10^{5.08}$	$10^{5.5}$	$10^{5.35}$	2

[Table options](#)

*The mean titre was calculated using the Karber's formula [$\text{Log CCID}_{50} = L - d(S - 0.5)$] with an allowance of + 0.5 log units

Conclusion: On average the vaccine vials used in the study were potent with satisfactory VVM and mean serotype titre. We found that some OPV vials had dissatisfactory VVM stage. Vaccine potency was seen to be directly proportional to VVM stage of vaccine vials. Vaccine vials kept at temperatures below -18 °C had a better VVM leading to a better potency status. Some OPV Samples which had lower titre of serotype 2 were contributed to by the temperature of the equipment they were stored at.