Research

Has oral fluid the potential to replace serum for the evaluation of population immunity levels? A study of measles, rubella and hepatitis B in rural Ethiopia

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Objective To assess the suitability of using oral-fluid samples for determining the prevalence of immunity to vaccine-preventable infections.

Methods Paired blood and oral-fluid samples were obtained from 853 individuals of all ages from a rural Ethiopian community. Oral fluid around the gums was screened for measles- and rubella-specific antibodies using enhanced IgG antibody capture (GAC) enzyme-linked immunosorbent assays (ELISAs), and for anti-HBc antibodies using a prototype GACELISA. IgG antibodies in serum to measles, rubella and HBc were determined using commercial ELISAs.

Findings Relative to serum, oral fluid assay sensitivity and specificity were as follows: 98% and 87% for measles, 79% and 90% for rubella, and 43% and 87% for anti-HBc. These assay characteristics yielded population prevalence estimates from oral fluid with a precision equal to that of serum for measles (all ages) and rubella (ages <20 years).

Conclusion Our results suggest that oral fluid could have the potential to replace serum in IgG antibody prevalence surveys. Further progress requires assessment of variation in assay performance between populations as well as the availability of standardized, easy to use assays.

Keywords Saliva/immunology; Gingival crevicular fluid/immunology; Serologic tests; IgG/diagnostic use; Enzyme-linked immunosorbent assay/utilization; Sensitivity and specificity; Measles/immunology; Rubella/immunology; Hepatitis B antibodies/immunology; Rural population; Comparative study; Ethiopia (*source: MeSH*).

Mots clés Salive/immunologie; Exsudat gingival/immunologie; Séro-diagnostic; IgG/usage diagnostique; ELISA/utilisation; Sensibilité et spécificité (Epidémiologie); Rougeole/immunologie; Rubéole//immunologie; Anticorps anti-HBV; Population rurale; Etude comparative; Ethiopie (*source: INSERM*).

Palabras clave Saliva/inmunología; Fluido crevicular gingival/inmunología; Tests serológicos; IgG/uso terapéutico; Test de ELISA/utilización; Sensibilidad y especificidad; Sarampión/inmunología; Rubéola/inmunología; Anticuerpos de la hepatitis B; Población rural; Estudio comparativo; Etiopía (*fuente: BIREME*).

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Introduction

Community surveys of the prevalence of specific IgG antibodies have frequently been used to study the epidemiology and improve control of viral infections. For example, the proportion of individuals with specific IgG antibody, stratified by age, provides information on population immunity and susceptibility, rates of transmission, vaccine "take", and target ages and coverage for elimination (1–7). The

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need for such surveys is increasing worldwide, particularly for the evaluation and refinement of immunization programmes, e.g. measles elimination strategies (8) and rubella control programmes (9, 10). However, the full potential of antibody prevalence studies will not be realized, most especially in the developing world, as long as such studies depend on the collection of blood samples.

The use of samples of oral fluid as a non-invasive alternative to blood for the detection of virus-specific antibodies was first promoted in 1987 (11). Assays that are sensitive and specific for IgG antibodies to human immunodeficiency virus type 1 (HIV-1) in saliva and urine have subsequently been widely used for surveillance, and commercial assays for this purpose are now available. In comparison, development of oral-fluid IgG antibody detection assays for most other viral infections has been slow. Assays that reliably detect measles-, mumps-, and rubella-specific IgM in oral fluid are used for surveillance purposes in the United Kingdom (12, 13); however, it has proved difficult to develop oral-fluid-based measles- and rubella-specific IgG assays that are sensitive enough to replace serum assays.

The results of recent studies have, however, moved us closer to realizing the wider use of oral fluid in surveys of viral-specific IgG. For example, novel specific IgG enzyme-linked immunosorbent assays (ELISAs) based on antibody capture that are of adequate sensitivity and specificity to substitute for serum have been developed and evaluated for measles (14) and rubella (15).

Increased use of surveys of specific IgG antibody prevalence as a tool in immunization programme evaluation and epidemiological studies will depend on the demonstration of the utility of oral-fluid methods for this purpose. We report here the results of a study of the use of oral-fluid samples to determine IgG antibodies specific to measles, rubella, and hepatitis virus B core antigens in a rural community of southern Ethiopia. Attention focused on the utility of oral fluid in population prevalence estimation studies rather than on the diagnosis of infection at the level of the individual.

Materials and methods

Study population and survey design

The district of Butajira, where the study was carried out, lies 130 km SSW of Addis Ababa, capital of Ethiopia, and is flanked to the SE by the edge of the Rift Valley and to the NW by the Gurage mountains. The population of 250 000 consists largely of subsistence farmers, has high density, and is dispersed in villages located at 1500–2300 m altitude, with in addition a small town of 10 000 population. Administratively there are 82 villages or farmers' associations (FAs), and 4 urban dwellers' associations (UDAs) or kebeles in the town, each with a population of 2500–5000. Measles vaccination coverage is low in the district (study sample: village mean, 16.6%; and

town mean, 54.8%) and there is no vaccination coverage against viral hepatitis B or rubella. Since 1986 the study site has formed the basis for a longitudinal demographic and health surveillance programme known as the Butajira Rural Health Project (BRHP) (16, 17). The BRHP study population comprises 37 000 inhabitants in 9 FAs and 1 kebele (10 clusters), with each cluster selected from the total administrative units with probability proportional to size.

We conducted a survey between May and November 1997 in which oral-fluid samples were collected from all consenting and available occupants (4631 of 5063 (91.5%)), irrespective of age, of 77–87 households in each of the 9 FAs and of 167 households of the UDA (with households selected by simple random sampling from the total recorded in the BRHP register). A venous blood sample was also requested from a 20% sub-sample of the participants from each cluster (selected by simple random sampling from the complete village list in the BRHP register). The results from the paired blood and oral-fluid samples form the basis of this paper.

By means of questionnaires, we obtained details on the sociodemographic characteristics of each member of the study households. Data on the age and sex of individuals could be verified against the demographic database of the BRHP.

The study was approved by the Coventry Research Ethics Committee, Coventry Health Authority, England; and the Science and Ethics Committee, Faculty of Medicine, University of Addis Ababa, Addis Ababa, Ethiopia. Oral informed consent was obtained from all participants or their guardians.

Sample collection and processing

Collection and processing of oral fluid were carried out using procedures that had been defined in a pilot study conducted in the study area (18). The device employed, a cylindrical sponge on a plastic stick used in the manner of a toothbrush, collects a sample rich in gingivo-crevicular exudate. Samples were collected and stored in a cool box with ice blocks during a working day and returned to the BRHP compound in Butajira town, where the oral fluid was extracted into transport buffer (18) and stored at 4 °C until weekly transport to the laboratory (Ethiopian Health and Nutrition Research Institute (EHNRI)) in Addis Ababa for storage at –20 °C.

Venous blood samples were collected by medical personnel using the Vacutainer System with 21G–23G needles (Becton Dickinson, Oxford, England). The samples were allowed to clot and serum was aspirated into labelled vials and stored at 4 °C until the weekly transport to EHNRI, where they were frozen at –20 °C.

Screening methods

Rubella- and measles-specific antibody status (+ve/ –ve) of oral fluids was determined using IgG

antibody capture ELISAs (GACELISAs) with FITC/anti-FITC amplification (FITC = fluorescein isothiocyanate), as described previously (14, 15). Specific IgG antibody status (+ve/–ve) to hepatitis B core antigen (anti-HBc) in oral fluids was determined using a prototype GACELISA similar to that employed for rubella and measles, though without FITC/anti-FITC amplification (this step was excluded because insufficient monoclonal anti-HBc was available for FITC conjugation). The method follows the procedure employed for the rubella GACELISA (15) with the following modifications: incubation for 1 h with recombinant HBc antigen (Murex Biotech Ltd, Dartford, England) diluted 1:3000 in phosphate-buffered saline (PBS) containing 0.05% Tween 20; incubation for 2 h with a mouse anti-HBc monoclonal antibody (Murex Biotech Ltd, Dartford, England) diluted 1:100 000 in PBS containing 10% fetal calf serum (FCS), 2% human serum negative for anti-HBc IgG (NHS) and 0.2% Tween 20; incubation for 30 min with an anti-mouse horseradish peroxidase conjugate (Dako Ltd, Ely, England) diluted 1:3500 in PBS containing 10% FCS, 5% normal rabbit serum and 0.2% Tween 20. Included as controls were 4 wells of a serum strongly positive for anti-HBc IgG and 4 wells of NHS. The mean oral-fluid result corresponding to 183 serum negatives in the survey, plus 3 standard deviations, gave an absorbance (A) ($A_{\lambda=450\ nm}/A_{\lambda=620\ nm}$) of 0.150 and was used as a working cut-off value.

Serum samples were screened for IgG antibodies specific to measles, rubella and hepatitis B core antigens using commercially available ELISAs (rubella and measles: Behring Enzygnost, Dade-Behring, Milton Keynes, England; hepatitis B: Hepanostika AHBC Uniform II, Organon Teknika, Akzo Nobel, Boxtel, Netherlands), and were ascribed negative, positive or equivocal status according to the manufacturer's instructions.

Data analysis

Data were entered on Epi Info (19) and analysed using Stata software (Intercooled V6.0, Stata Corporation, College Station, TX, USA). Standard formulae were used to calculate sensitivity (Se) and specificity (Sp) of oral-fluid results relative to serum results, and exact 95% confidence limits (95% CL) were calculated (20). Age-specific proportions were compared using 95% CL. The kappa (κ) statistic was used to assess the degree of (inter-rater) agreement between oral-fluid and serum antibody status for each antigen (21), with $\kappa = 1$ indicating perfect agreement, $\kappa = 0$ no better than that expected by chance, and $\kappa < 0$ worse than that by chance. The κ statistic was tested to assess the probability that it could arise from a population in which there was no agreement. The following interpretation of the κ statistic has also been proposed: $\kappa < 0$ poor, $\kappa = 0–0.2$ slight, $\kappa = 0.21–0.4$ fair, $\kappa = 0.41–0.6$ moderate, $\kappa = 0.61–0.8$ substantial, $\kappa = 0.81–1$ almost perfect agreement (21).

The oral-fluid-determined specific antibody prevalence (p_o) is intended to provide an estimate of the "true" prevalence in the population (p_T). These two prevalences are related through α and β, the false positivity (1–Sp) and negativity (1–Se) rates, respectively, as shown in eq. (1)(22):

$$p_T = (p_o - \alpha)/(1 - (\alpha + \beta)) \qquad \text{eq. (1)}$$

Insertion of values for the 95% CL for p_o into eq. (1) generates the corresponding 95% CL for the "true" prevalence estimates, which permit comparison of the precision of "true" prevalence (p_T) estimated from oral fluid (p_o) with that estimated directly from serum (p_s). Ideally, estimates of population prevalence using oral fluid should have the same precision as those obtained using serum.

Results

Blood samples were obtained from 914 of 1004 selected individuals (91%). Paired blood and oral fluid specimens were available from 853 individuals (age range: 1 week to 84 years; mean age: 23.3 years; 47% male) from 604 households. There was no significant difference in mean age (one-way ANOVA, $n = 853$, F test $(9,843) = 0.72$, $P = 0.688$) or sex ratio (Pearson's χ^2 test $(9) = 8.036$, $P = 0.530$) between the 10 clusters.

Serum antibody results for rubella were determined for 842 serum: oral-fluid pairs, of which 667 (79%) were positive and 11 (1%) equivocal. For measles there were 838 sample pairs of which 726 (87%) were serum-antibody positive and 14 (2%) were equivocal, and for hepatitis B a total of 538 pairs, 321 (60%) sera being anti-HBc positive (the test did not specify an equivocal range). The sample sets for each antigen did not differ significantly in terms of the mean age, age range, or sex ratio of the subjects. Sample pairs with equivocal serum results were excluded from analyses for their respective infections.

Comparison of the age-specific prevalence (with 95% CL) obtained using oral fluid and serum (Fig. 1) reveals a high degree of concordance for measles, with a maximum difference between prevalences of 4% (age group, 0–4 years). For rubella, there was a close similarity in prevalence for age groups under 20 years, but increasing discordance for older ages, with significant differences for groups aged 20–29 years and older. Anti-HBc prevalence shows poor agreement throughout the age range.

The comparative performance of the oral-fluid and serum assays are shown in Tables 1–3 . Overall sensitivity and specificity were 97% and 87% for measles, 79% and 90% for rubella and 43% and 87% for anti-HBc (Table 1 and Table 2, receptively). There was agreement between oral-fluid and serum results for 96% of observations for measles, 81% for rubella, and 61% for hepatitis B. In each instance the difference between the agreement expected by random processes and that observed was statistically significant, although the κ statistic decreased mark-

edly from measles (almost perfect agreement) to rubella (moderate) to anti-HBc (fair) (Table 3).

Stratification of the analysis by age resulted in no difference in assay sensitivity for measles but a decline with age for rubella and hepatitis B (Table 1). For specificity there was some evidence of a decrease with age for measles, but no significant differences for rubella or hepatitis B (Table 2). Nevertheless, the specificity of 69% for hepatitis B for the age group 0–4 years appears low relative to that for the other age groups. Excluding from the analyses data for the few children aged <1 year (≤6 for each antigen), who might have been influenced by maternal antibodies, had no affect on assay performance for the age group 0–4 years. The few seronegatives among those in age groups 15–19 years and older for measles and 20–29 years and older for rubella prevents the reliable estimation of specificity for these groups.

Fig. 2 compares the 95% CL for the "true" prevalence, p_T (dotted lines), estimated from the 95% CL for oral-fluid prevalence, p_o (Fig. 1), with the 95% CL for serum prevalence, p_s (vertical bars). The age-specific sensitivity and specificity used to relate p_o and p_T through eq. (1) are shown in Table 1 and Table 2, respectively. For age groups where specificity estimates were undefined due to insufficient data (Table 2), the average value for the total sample was substituted (which is reasonable since there was no evidence of age-specific trend in specificity). The confidence limits of p_T and p_s were coincident throughout the age range for measles (Fig. 2a). A similar result was obtained for rubella up to the 15–19-year age group, but for older age groups the lower bound confidence limit for p_T was appreciably less than that for seroprevalence, p_s (Fig. 2b). For anti-HBc (Fig. 2c) the confidence intervals for p_T were markedly wider than for p_s for all age ranges. These results give an indication of the variation in the estimated "true" prevalence derived from oral-fluid surveys relative to the prevalence estimated from serum surveys, i.e. the reliability of p_T relative to p_s.

Discussion

Using samples collected from households within a rural developing country community, we found a tight correlation between antibody prevalence in oral fluid and seroprevalence for measles for all age groups studied, and also for rubella for age groups under 20 years. Agreement between oral-fluid results and "gold standard" serum results was over 96% for measles (Se = 97% and Sp = 87%). For rubella the agreement was 89% (Se = 88% and Sp = 90%) for age group 0–19 years but performance was poorer (lower sensitivity) for over-19-year-olds, as it was for anti-HBc (lower specificity) for all age groups, resulting in marked differences between the prevalences determined using oral fluid and serum.

For measles (all age groups) and rubella (age range, 0–19 years), the confidence in the estimated prevalence was the same, irrespective of whether oral

Fig. 1. **Age-prevalence of specific IgG antibodies to a) measles, b) rubella and c) hepatitis B core antigens in Butajira District, southern Ethiopia, 1997, determined using serum (open columns) and oral-fluid (shaded columns) sample pairs. Vertical lines indicate exact 95% confidence limits**
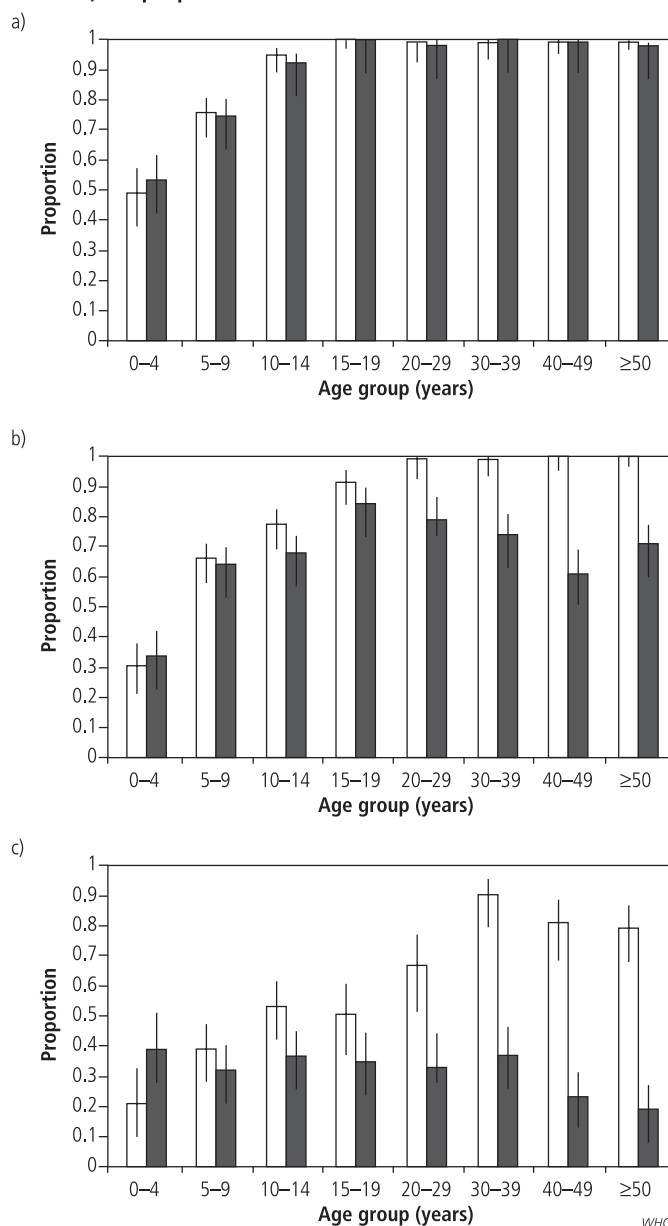
fluid or serum was used (i.e. the 95% CL were identical). For oral-fluid prevalences, we have less precision in the lower 95% CL for age groups over 19 years for rubella, and for HBc less precision in both upper and lower limits.

These preliminary results show the high potential for oral fluid as a replacement for serum in antibody prevalence surveys. They should be viewed also in the context of the major advantages of oral-fluid sampling over blood collection: it is non-invasive, more acceptable to subjects of all ages (reflecting absence of pain and low or no perceived risk of contamination), easier to collect without the need for medically trained personnel, and safer for the collectors (*18, 22–25*). Nevertheless, wider application of this methodology requires further

Table 1. **Sensitivity of oral-fluid GACELISAs using paired serum: oral-fluid samples from rural Ethiopia, 1997**

Age group (years)	Measles		Rubella		anti-HBc	
	Sensitivity (%)	n[a]	Sensitivity (%)	n	Sensitivity (%)	n
Total	97.5 (96.1–98.3)[b]	726	78.9 (75.6–81.2)	667	42.7 (37.2–46.8)	321
0–4	100 (92–100)	45	86 (67–94)	28	67 (30–89)	9
5–9	96 (91–99)	113	92 (85–96)	101	68 (49–79)	34
10–14	95 (90–98)	131	84 (76–89)	108	59 (43–70)	46
15–19	100 (96–100)	102	90 (82–94)	93	51 (34–65)	35
20–29	97 (89–99)	63	78 (66–85)	63	45 (27–60)	31
30–39	99 (94–100)	84	73 (63–80)	86	40 (28–51)	57
40–49	98 (93–100)	79	59 (48–68)	81	25 (14–36)	48
⩾50	96 (91–99)	109	69 (59–76)	107	23 (13–32)	61

[a] n = denominator for sensitivity calculation.

[b] Figures in parentheses are the exact 95% confidence intervals.

Table 2. **Specificity of oral-fluid GACELISAs using paired serum: oral-fluid samples from rural Ethiopia, 1997**

Age group (years)	Measles		Rubella		anti-HBc	
	Specificity (%)	n[a]	Specificity (%)	n	Specificity (%)	n
Total	86.7 (78.4–91.5)[b]	98	89.6 (83.9–92.9)	164	87.1 (81.9–90.3)	217
0–4	91 (80–97)	47	90 (80–95)	67	69 (51–80)	35
5–9	95 (82–99)	38	91 (79–96)	53	91 (80–96)	54
10–14	75 (35–95)	8	91 (76–97)	33	90 (77–96)	41
15–19	ID[c]	0	89 (52–100)	9	83 (66–91)	35
20–29	ID	1	ID	1	94 (70–100)	16
30–39	ID	2	ID	1	100 (59–100)	7
40–49	ID	1	ID	0	92 (62–100)	12
⩾50	ID	1	ID	0	100 (80–100)	17

[a] n = denominator for sensitivity calculation.

[b] Figures in parentheses are the exact 95% confidence intervals.

[c] ID = insufficient data (n ⩽ 5).

research and developments in a number of areas, as discussed below.

Further work is required to quantify and improve assay performance. Estimates of assay specificity for rubella- and measles-specific IgG were unreliable for older age groups because these groups had low numbers of seronegative individuals and studies with larger sample sizes are therefore needed. The sensitivity of oral-fluid assays for specific rubella IgG declines with age (15, 18, 22), and is associated with an age-related decrease in rubella-specific antibody levels in serum and in oral fluid (18, 22). These effects could be associated with the time elapsed since primary infection or an age-related decrease in boosting from re-exposure (15, 22), although such effects do not influence the sensitivity of the measles assays. Assay performance is influenced by the quality of the oral-fluid sample, although there is some debate over what provides a good measure of quality (14, 15, 18). For example, a sub-sample of 160 oral fluids collected in this study all had detectable levels of total IgG, and although the range in concentration was wide (1.1 μg/ml to >60 μg/ml (14)), assay sensitivity to measles-specific IgG was only marginally lower in samples with lower total IgG. Furthermore, the nature of the relationship between virus (rubella) specific IgG and total IgG in oral-fluid samples is a function of the type of device used to collect the specimen (18). Previous studies suggest that the dental status of infants does not unduly affect the transudated serum IgG antibody component of oral-fluid samples (22, 26). Nonetheless, further data would be worth collecting. The thermal stability of IgG in oral fluid samples is a

concern, particularly in developing countries that may be experiencing difficulties in the cold chain. It has been reported that there was no loss in performance with an HIV antibody assay carried out on saliva samples stored for one month at ambient temperature in a tropical country (27). Similar studies on assays for acute viral infections using a variety of collection devices should also be carried out.

Any variation in assay performance between communities with different transmission rates (e.g. urban versus rural) or vaccination coverage levels for measles, rubella, and viral hepatitis B requires further investigation. Measles and rubella serum-specific IgG levels are lower among vaccinated individuals than among those who were infected by the wild viruses (28–30). Thus, assay sensitivity may vary according to whether individuals in different age groups have vaccine-induced or natural immunity, and according to the degree of boosting from re-exposure, which will vary by time and place, e.g. as vaccination coverage changes. Studies involving paired serum: oral fluid sampling are therefore indicated in a range of communities that are representative of different epidemiological and vaccination situations.

The laboratory methods used in this study to detect measles- and rubella-specific IgG in oral fluid are based on ELISA tests amplified by the FITC/anti-FITC method (31). This resulted in assays whose sensitivity and specificity approached those of the corresponding radioimmunoassays (14, 15, 32). Since the amplified ELISAs avoid the use of radioactive materials and the component reagents are commercially available, they can be employed by any laboratory equipped for ELISA testing. As currently formulated, however, the ELISA diluents require the presence of low concentrations of measles- or rubella-antibody negative sera to prevent non-specific reactions (14, 15). Further studies are therefore indicated to evaluate alternative assay detector systems, such as the gelatin particle agglutination described for measles antibody detection (33). Performance of the prototype anti-HBV GACELISA using a standard detection system fell short of that of the amplified ELISAs for measles and rubella in terms of sensitivity but not specificity. Adaptation of the assay to incorporate the amplification system may enhance its performance, and by analogy that of assays for other viral infections (e.g. herpesviruses).

More generally, the adoption by laboratories of oral-fluid based assays for immunity prevalence studies will probably not occur until such assays are improved sufficiently so that their characteristics are comparable to those of currently available serum-based alternatives, e.g. reproducibility of performance and standardization of cut-off level for antibody positivity, adequate positive and negative controls, ready-made reagents, and ease of use with minimal equipment. Specific to oral fluid would be the need to be able to verify the adequacy of the samples collected. Current techniques fall short of these requirements in

Table 3. **Extent of agreement between serum and oral-fluid results from Butajira District, southern Ethiopia, 1997**

Specific antibodies	Agreement (%)	κ statistic[a]	P-value[b]
Measles	96.2	0.82	<0.001
Rubella	81.0	0.53	<0.001
Anti-HBc	60.6	0.267	<0.001

[a] Percentage difference between random and perfect agreement (21).

[b] Probability that the observed agreement could arise by chance.

Fig. 2. **Upper and lower 95% confidence limits for predicted "true" antibody prevalence, p_T, estimated from oral fluid prevalence, p_O (dotted lines), using eq. (1) (see Methods), compared with 95% confidence limits for seroprevalence (vertical lines), for a) measles, b) rubella, and c) hepatitis B core antigens in Butajira District, southern Ethiopia, 1997**
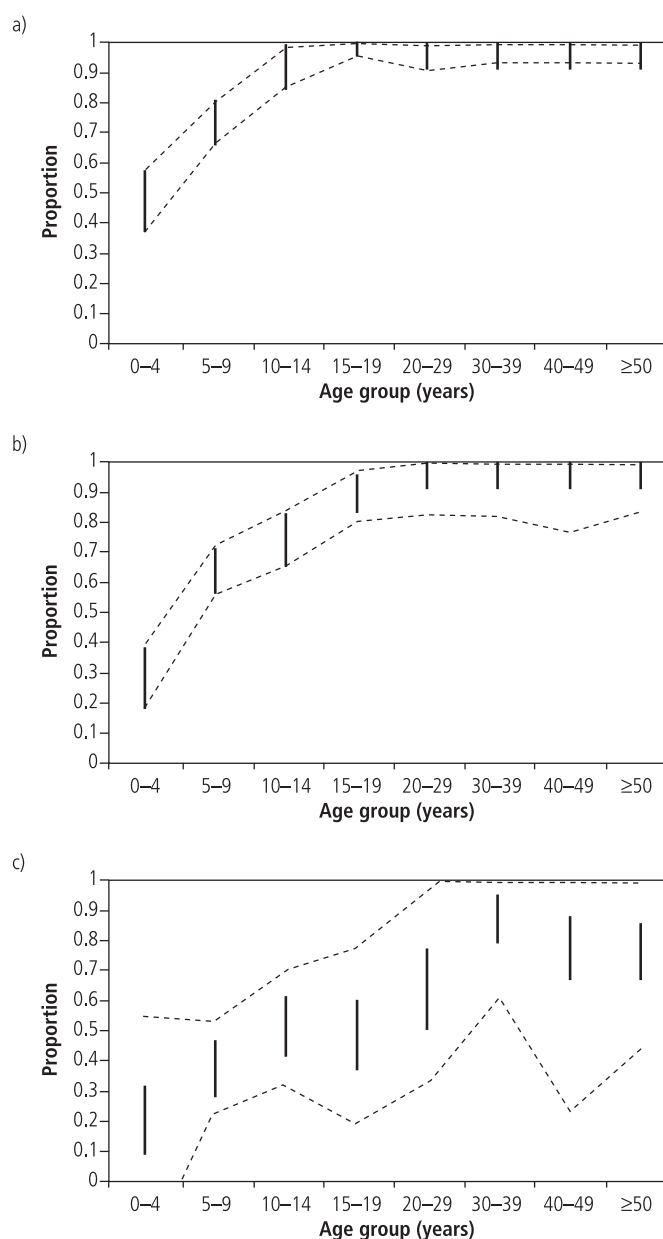
WHO 01.103

various aspects and, as was the case for serum assays, development of the desired off-the-shelf kit products may require commercial input.

The potential role of antibody prevalence surveys in immunization programme development and refinement is only now becoming generally appreciated. Such surveys are important for identifying target age groups for measles vaccination (*3, 34*), providing data on the burden of disease from congenital rubella syndrome (*9*) and hepatitis B infection (*35*), and monitoring their respective control programmes (*6, 36*). With the practical demonstration in this study of the potential of oral-fluid samples for this purpose, under demanding operational conditions, the availability of such surveys becomes one step closer. Developing countries have increased access to ELISA technology, both through HIV control programmes and the expanding global network of laboratories for measles surveillance, which will build upon that established for polio eradication (*8*). At the national level (or below in larger countries) laboratories will have the capacity for measles diagnosis by ELISA-based IgM assays, with quality assurance and links to epidemiological investigations. Such laboratories would also have the capacity to screen sera for specific IgG antibodies to measles and other viral infections. This would clearly provide a suitable platform for expanding the capacity for oral-fluid surveys worldwide. ■

Résumé

Les sécrétions buccales peuvent-elles remplacer le sérum pour l'évaluation du niveau d'immunité d'une population ? Etude sur la rougeole, la rubéole et l'hépatite B dans une communauté rurale d'Ethiopie

Objectif Evaluer l'utilité des échantillons de sécrétions buccales pour déterminer la prévalence de l'immunité vis-à-vis d'infections évitables par la vaccination.

Méthodes Des échantillons appariés de sang et de sécrétions buccales ont été prélevés chez 853 personnes de tous âges dans une communauté rurale d'Ethiopie. Les échantillons de liquide gingival ont été soumis à une recherche des anticorps spécifiques de la rougeole et de la rubéole par titrage immuno-enzymatique (ELISA) avec capture d'IgG et amplification (GACELISA), et des anticorps anti-HBc au moyen d'un prototype de test GACELISA. Les IgG sériques vis-à-vis de la rougeole, de la rubéole et du HBc ont été déterminés à l'aide de tests ELISA du commerce.

Résultats Par rapport aux résultats obtenus avec le sérum, la sensibilité et la spécificité des titrages réalisés sur les sécrétions buccales étaient de 98 % et 87 % pour la rougeole, 79 % et 90 % pour la rubéole et 43 % et 87 % pour les anticorps anti-HBc. Ces caractéristiques ont permis d'obtenir avec les sécrétions buccales des estimations de la prévalence d'une précision égale à celle obtenue avec le sérum pour la rougeole (tous âges) et la rubéole (moins de 20 ans).

Conclusion Nos résultats indiquent que les sécrétions buccales pourraient remplacer le sérum dans les enquêtes sur la prévalence des IgG. Il faudra maintenant évaluer les différences de performance des titrages d'une population à l'autre et pouvoir disposer de tests normalisés faciles à utiliser.

Resumen

Muestras de saliva: ¿una posible alternativa al suero para evaluar los niveles de inmunidad de una población? Estudio sobre el sarampión, la rubéola y la hepatitis B en la Etiopía rural

Objetivo Evaluar la idoneidad de las muestras de saliva para determinar la prevalencia de inmunidad a infecciones prevenibles mediante vacunación.

Métodos Se obtuvieron muestras apareadas de sangre y saliva de 853 personas de todas las edades pertenecientes a una comunidad rural de Etiopía. Se cribó la saliva próxima a las encías para detectar anticuerpos específicos contra el sarampión y la rubéola, mediante técnicas de inmunosorción enzimática (ELISA) con captura potenciada de anticuerpos IgG (GAC), y anticuerpos anti-HBc, mediante un prototipo de GACELISA. Los anticuerpos IgG séricos contra el sarampión, la rubéola y HBc se determinaron mediante técnicas comerciales de ELISA.

Resultados En comparación con el suero, la sensibilidad y especificidad de las pruebas realizadas con saliva fueron respectivamente las siguientes: 98% y 87% para el sarampión, 79% y 90% para la rubéola, y 43% y 87% para anti-HBc. Esas cifras arrojan unas estimaciones de la prevalencia poblacional a partir de la saliva de una precisión

comparable a la conseguida con muestras de suero para el sarampión (todas las edades) y la rubéola (edad < 20 años). **Conclusión** Los resultados obtenidos parecen indicar que la saliva podría reemplazar al suero en los estudios de prevalencia de anticuerpos IgG. En futuras investigaciones deberá evaluarse la variación de los resultados de la prueba entre poblaciones, así como la disponibilidad de pruebas normalizadas de fácil uso.

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