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AIDS and tuberculosis control programmes: an integrated approach at educational level

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ABSTRACT: *AIDS and tuberculosis control programmes: an integrated approach at educational level. G.B. Migliori, A. Spanevello, V. Manfrin, A. Abongomera, R.F.E. Pedretti, L. Ballardini, M. Neri, A. Borghesi.*

In developing countries with a high prevalence of individuals co-infected by human immunodeficiency virus (HIV) and tuberculosis (TB), urgent public health measures should be implemented to prevent the spread of both diseases.

This study was performed by a combined acquired immune deficiency syndrome (AIDS)-TB health team with the following aims: 1) to assess knowledge, attitudes and practice towards AIDS; 2) to identify target groups for health education (HE); 3) to evaluate HE impact; 4) to circulate correct information on AIDS and TB through target groups; and 5) to evaluate integration of AIDS and control TB activities.

Secondary school students of Arua District, Uganda, participated in a standardized HE session (covering the key-points of AIDS and TB control) preceded by a pretest (multiple choice) questionnaire and followed 3 months later by the same questionnaire (post-test). The impact of HE on AIDS control was evaluated by comparing answers to pre- and post-test questionnaires and its influence on the TB programme by evaluating case-finding performances in the period preceding and following the survey.

We analysed 1,478 questionnaires. The results of our study gave information on knowledge about AIDS, identified females and students <16 yrs of age as good targets for HE, revealed that the impact of HE was significantly associated with improved knowledge, contributed to improved TB case-finding and offered suggestions for the integration of programmes.

The survey represented an opportunity to create a stable AIDS/TB health team at district level.

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Tuberculosis (TB) and acquired immune deficiency syndrome (AIDS) were recently termed the "cursed duet", as the human immunodeficiency virus (HIV) epidemic is contributing to the increasing TB incidence both in developed and developing countries [1–7]. The high prevalence of dually-infected patients within the young generations is particularly affecting developing countries, where urgent public health measures should be implemented in order to improve the cure rate of TB patients and reduce HIV transmission as much as possible [4–6, 8].

In Uganda, both TB and HIV infections are first class health priorities, the risk of acquiring TB infection being around 2% per annum [4, 9], the number of notified AIDS cases 12,444 up to February 1990 (doubling every 6 months, the true number being probably three times higher) and the prevalence of HIV seropositivity in the general population ranging 5.5–29.1% in 1989 [10].

A strict co-ordination between the AIDS Control Programme (ACP, established to fight the HIV pandemic by screening blood donors, increasing surveillance procedures, implementing health education) and the TB Control Programme (TBCP) was suggested, particularly at educational level [10, 11]. As a change in human behaviour regarding sex, attitudes and practices could reduce the spread of the HIV infection, great effort was put into Health Education (HE) activities by the Uganda Ministry of Health and International Agencies, focusing on educating attitudes, beliefs and social customs [12, 13]. Since the cost of such campaigns could be prohibitive for low-income countries, the identification of target groups (ideally not yet infected, and receptive to HE messages) was suggested [14]. The evaluation of HE campaigns is a crucial issue. However the key point (*i.e.* the measure of a change in human behaviour) is very difficult to accomplish unless cohort groups are followed up for a reasonable length of time [13, 15]. To investigate this issue, a knowledge, attitude and practice (KAP) study was organized as a co-ordinated effort of the ACP and TBCP at district level.

The aims of the study were: 1) to assess current knowledge, attitude, behaviour and practice towards AIDS and related issues; 2) to identify target groups on which to concentrate cost-effective educational efforts; 3) to evaluate the HE impact; 4) to spread correct information concerning AIDS and TB to the general population through the target groups; and 5) to pretest ACP/TBCP co-ordinated activities at different levels.

Materials and methods

Population and questionnaires

The study was carried out in Arua district (fig. 1) during the months of March and June, 1988. Arua district was chosen for the following reasons: 1) the demographic distribution of people, with an urban setting (Arua town, about 40,000 inhabitants) surrounded by a rural area (about 540,000 inhabitants), offered the opportunity to investigate different realities; 2) the District Medical Office had an organized combined ACP-TBCP health team since 1987; and 3) the survey was supported by an International Agency within the framework of a structured health-co-operation project.

All secondary schools located in the district (13 schools: nine of which were composed of students of both sexes; two of males only and two of females only) were pre- and post-tested using the same single and multiple choice, individually self-administered questionnaire (table 1 and 2). The questionnaire was properly designed by the District Education Office to avoid embarrassing situations and inhibited answers. Two months before administration, the questionnaire was evaluated by a pilot study in a primary school, the HE was standardized (in terms of teaching methods, language and topics), and the planned calendar was sent to all the headmasters. The questionnaire covered the following topics: 1) personal details; 2) general information on AIDS; 3) sources of information; 4) AIDS transmission; 5) AIDS prevention; 6) care of AIDS patients.

Although the questionnaire was based mainly on AIDS-related questions, the HE session covered the following topics: 1) aetiology of AIDS; 2) modes of HIV transmission and prevention; 3) clinical spectrum of HIV disease; 4) essential principles of ACP; 5) aetiology of TB; 6) modes of TB transmission and prevention: 7) role played by anti-TB treatment (and patients' compliance) in improving the epidemiological situation and reducing drug resistance; 8) basic elements of HIV-TB interactions; 9) essential principles of the TBCP; and 10) essential information on other ongoing health programmes in the District (Expanded Programme on Immunization, Control of Diarrhoeal Diseases).

The educational team was composed of personnel in charge of the ACP and TBCP (two health educators, four registered nurses and midwifes, two expatriate medical officers).

The completing of the questionnaire (pretest) was followed by the HE session. Three months later the same procedure was used (post-test), including a strengthening of the educational message. All students attending school on the day of the pretest were enrolled in the study. As the questionnaire was anonymous, each student was given a precoded number to identify his/her pre- and post-tests.

Fig. 1. – Map of Uganda and West Nile region with location of Arua District.

Table 1. – Questionnaire administered to 1,478 students during an initial test (pretest) and after an intervention (post-test)

Question	Possible answer
1. Have you heard about AIDS?	Y/N
2. Have you heard about slim?	Y/N
3. What is AIDS?	MC (four possible answers)*
4. What is slim?	MC (four possible answers)*
5. Is AIDS a problem to...?	MC (four possible answers)*
6. Have you seen AIDS patients?	Y/N
7. Do you know how you can get AIDS?	Y/N
8. Explain it	MC (four possible answers)*
9. Is AIDS curable?	Y/N
10. Is AIDS preventable?	Y/N
11. How do you protect yourself?	MC (eight possible answers)*
12. Do you know what a condom is?	Y/N
13. Do you know how to use it?	Y/N
14. Explain it	Free space
15. Do you/your partner use it?	Y/N
18. What do you think about AIDS patients?	MC (six possible answers)*
19. Should a patient be informed?	Y/N
20. Should a health carrier be informed of his status?	Y/N
21. Would you agree to be screened?	Y/N
22. How do you get your information?	MC (10 possible answers)

These questions were used to evaluate the students' feelings about the problem.*: possible answers are listed in table 2. MC: multiple choice questions; Y/N: yes/no; AIDS: acquired immune deficiency syndrome.

Table 2. – Summary of the more relevant answers pre- and post-test (1,478 secondary school students, Arua District)

Question	Pretest n	Pretest %	Post-test n	Post-test %	p-value
5. Is AIDS a problem to					
the world	1356	92	1405	95	<0.0001
Uganda	1216	82	1350	91	<0.0001
your district	1065	72	1253	85	<0.001
your village	901	61	1122	76	<0.0001
8. Do you know how you can get AIDS?					
sexual intercourse	1360	92	1422	96	<0.0001
blood transfusions	1246	84	1390	94	<0.0001
unsterile needles	1082	73	1317	89	<0.001
mother-to-child	577	39	967	65	NS
other	1200	81	560	38	<0.0001
10. Is AIDS preventable? (Yes answer)	1036	70	1110	75	<0.0001
11. How do you protect yourself?					
avoiding injections/cuts	1049	71	1222	83	<0.0001
having one sexual partner	1029	70	1256	85	<0.001
reducing number of sexual partners	992	67	1080	73	<0.0001
using condoms	657	45	769	52	NS
other	443	30	209	14	<0.0001
18. What do you think about AIDS patients?					
should be kept in hospital	860	58	682	46	NS
should be cared for at home	184	12	416	28	<0.0001
should be helped	388	26	800	54	<0.0001

AIDS: acquired immune deficiency syndrome; NS: nonsignificant.

Before starting a 1.5 h HE session, students were given instructions on: pretest questionnaire completion; use of precoded identity numbers; choice of topics (ACP-TBCP and other relevant health programmes); discussion modalities (after the session); post-test data and modalities.

Statistical analysis

The answers were coded and summarized in a database file (DB4) and analysed using the Statgraphics statistical package, version 4.0. For the purpose of analysis, the questionnaires were classified into correct and incorrect. The questions evaluated to define a correct questionnaire are listed in table 3. A questionnaire containing a single wrong or unanswered question was classified as incorrect. Only the questionnaires belonging to students attending both pre- and post-tests were analysed.

The answers were stratified by sex, age-groups (<16 yrs and >16 yrs of age) and origin (urban/rural) using the 2×2 contingency tables with uncorrected Chi-squared test. To evaluate the impact of the HE campaign overall, we focused on post-test responders who answered differently to the questionnaire before and after the educational session, applying the McNemar Chi-squared test for nominal data (one degree of freedom (df), including Yates' correction for continuity). The same test was used to evaluate the single answers before and after HE. To evaluate the impact of HE on the TBCP, the figures obtained from the district register, concerning new and retreatment TB cases diagnosed from January 1 to March 31, 1988, were compared, using the Fisher exact test, with the figures of the period following the survey (July 1 to November 30, 1988). A p-value of less than 0.05 was considered to be statistically significant.

Table 3. – Predefined model questionnaire classified as correct for analysis purposes

Question	Correct answer
1. Have you heard about AIDS?	Yes
2. Have you heard about slim?	Yes
3. What is AIDS?	Infectious disease
4. What is slim?	Infectious disease
7. Do you know how you can get AIDS?	Yes
8. Explain it	Sexual intercourse Blood transfusion Nonsterile injection Mother-to-child transmission
9. Is AIDS curable?	No
10. Is AIDS preventable?	Yes
11. How do you protect yourself?	Avoiding injections/cuts Having one sexual partner Reducing number of sexual partners Using condoms
12. Do you know what a condom is?	Yes
13. Do you know how to use it?	Yes
14. Explain it	*

*: answers were classified as correct if an explanation which was reasonable and understandable was provided. AIDS: acquired immune deficiency syndrome.

Results

Of the 1,684 pretested students, 1,478 attended the post-test; only the latter questionnaires were considered for data analysis. The vast majority of double-tested students (1,107; 75%) declared that their fathers' profession was "farmer", and no significant

differences were found concerning social status stratifying data by sex, age-group and origin. Thus, the stratification of answers according to the social status was not pursued after the preliminary analysis. No significant difference was found comparing pretest of responders *versus* nonresponders to the post-test. Regarding the original setting of the double-tested students, 446 (30%) belonged to urban areas and two thirds of them to districts other than Arua. Personal and demographic details of the sample studied are presented in table 4.

Of the pretested students, 1,442 (97%) declared that they had some kind of information on AIDS. Their sources of information at the pretest were the following: newspapers (80%); radio (75%); health personnel (68%); friends (56%); church (53%); school (51%); and others (34%). In the post-test, all respondents attributed their knowledge to health personnel. The main findings of the KAP study are reported in table 4. The AIDS problem was felt to be progressively less important when approaching the village level. However, awareness increased after the HE effort. Promiscuity and blood transfusions appeared to be the most well-known causes of AIDS transmission. Four hundred and eighty seven students (33%) identified all the possible ways of transmission in the pretest as compared to 854 (58%) after HE ($p<0.0001$).

Concerning prevention, 1,003 of the 1,478 (68%) students were aware of the main measures (avoiding injections/cuts, reducing the number/having one sexual partner) before HE. Less than half (657; 45%) knew the role played by condoms. About a quarter (396; 27%) gave a correct explanation of their use, and 220 (15%) declared that they used them. After HE, a significant increase of correct answers was noticed ($p<0.0001$): control measures awareness 1,236 (84%); knowledge of condoms role in prevention 769 (52%); explanation of correct use of condoms 555 (38%). Stratifying data by sex, significantly more males (444 out of 945; 47%) than females (133 out of 533; 25%; $p<0.00001$) were aware of mother-to-child transmission in the pretest.

Table 4. – Personal and demographic data of 1,478 secondary school students (Arua District, Uganda)

		n	%
Sex	Males	689	64
	Females	389	36
Age	yrs*	18±6	
	<16 yrs	479	32
	Males	288	60
	Females	191	40
	>16 yrs	999	68
	Males	657	66
	Females	342	34
Civil status	Married	70	5
	Single	1408	95
Religion	Catholics	768	52
	Protestants	561	38
	Muslims	96	6.5
	Other	53	3.5
Origin	Urban	444	30
	Rural	1034	70

*: mean±SD.

In the post-test, a correct answer was given by 642 males (68%) and by 325 females (61%) ($p<0.01$), with a significant difference between pre- and post-test answers for both sexes ($p<0.01$).

In the pretest, males were more likely to identify the importance of having one sexual partner (675 out of 945 males (71%) *versus* 354 out of 533 females (66%); ($p<0.05$)), and the role of condoms (459 out of 945 (49%) *versus* 198 out of 533 (37%); $p<0.05$). In the post-test 825 males (87%) and 431 females (81%) correctly identified the importance of having one sexual partner ($p<0.001$), while 523 males (55%) and 246 females (46%) knew the preventive role of condoms (pretest *versus* post-test answers; $p<0.001$). Surprisingly, after HE the improvement in knowledge on the preventive role of condoms was significant for females (198 out of 533 in pretest *versus* 246 out of 533 in post-test; $p<0.001$) but not for males (459 out of 945 in pretest *versus* 523 out of 945 in post-test; NS). In addition, 343 out of 945 males (36%) ($p<0.00001$) explained correctly how to use condoms and 203 out of 945 (22%) ($p<0.00001$) used them, whilst only 43 out of 533 females (8%) gave a correct explanation of use and 26 out of 533 (5%) used them. The improvement after HE appears to be significant in both sexes ($p<0.001$). Stratifying data by age, students below 16 yrs of age (479; 32%), due to poor knowledge, appear to be at higher risk then older students (999; 68%). In the pretest, having one sexual partner was identified as a preventive measure by 296 out of 479 students <16 yrs of age (62%), and by 733 out of 999 (74%) in the >16 yrs age group ($p<0.00001$). In the post-test, the improvement was significant ($p<0.0001$): 397 out of 479 students <16 yrs of age (83%) and 859 out of 999 students >16 yrs of age (86%) correctly identified having one sexual partner as a preventive measure.

No relevant differences on the identification of the methods of transmission was found between the two age-groups. The role of condoms and their use appear to be less well-known by the younger group (knowledge: 178 out of 479 (37%) <16 yrs *versus* 479 out of 999 (48%) >16 yrs; $p<0.00001$; correct explanation: 110 out of 479 (23%) <16 yrs *versus* 286 out of 999 (29%) >16 yrs; $p<0.05$). No significant differences in the actual use of condoms were observed (NS). No significant differences were found stratifying data by origin (urban *versus* rural in the pretest; NS; urban *versus* rural in the post-test; NS). The improvement in correct answers before and after HE was significant both in urban and rural residents, with the exception of the preventive role played by condoms (pretest *versus* post-test answers in both groups; NS). The attitude towards AIDS patients improved after HE (table 2). The number of those who would be reluctant to inform patients or HIV carriers of their condition increased from 36 to 39% after HE (530 out of 1,478 *versus* 579 out of 1,478; $p<0.0001$). About two thirds of the subjects interviewed agreed in principle to be screened for HIV.

Correct and incorrect answers in pre- and post-tests are analysed in table 5. Overall, a significant improvement was observed between pre- and post-test. A significant difference was also observed

Table 5. – Statistical evaluation of the impact of the educational campaign

	Pre	Post
Correct answers %*	54±30	62±31
Incorrect answers %*	27±28	21±22

McNemar Chi-squared test for nominal data (1 df, including Yates' correlation) applied on 1,478 pre- and post-test responders

	Post-test	
Pretest	Correct	Incorrect
Correct	10	0
Incorrect	56	1412

*: mean±SD. df: degree of freedom. Chi-squared = 54.01786; p<0.00001.

between males and females, and different age-groups both before and after HE. A notable exception was represented by the nonsignificant improvement in male knowledge concerning the preventive role of condoms. A similar result arose by analysing the overall response to the same question (654 out of 1,478 in pretest *versus* 769 out of 1,478 in post-test; NS). Out of 1,478 post-tested students, only 10 (0.7%) answered correctly to all questions in pre- and post-tests. In addition, 56 students (3.8%) with partially incorrect pretest performed a correct post-test, whilst 1,412 students (96%) filled partially incorrect pre- and post-tests questionnaires. The overall HE impact was significant (p<0.00001). In addition, a positive impact on TBCP activities was noticed, with several new TB diagnoses and retreatments which were HE-related in 1988 [16]. In the period preceding the study, 188 new cases of TB were diagnosed *versus* 241 in the following period, (46 (19%) of them sent by one of the students or their families; p<0.001) and 12 defaulters restarted treatment *versus* 21 in the following period (11 (52%) of them as a possible consequence of the survey; p<0.005).

Discussion

The results of our study provided information on knowledge, attitude and practice towards AIDS, identified postprimary students as a good target for HE, revealed a positive impact of HE, contributed to an improvement in TB case-finding, and offered several suggestions for the integration of TB and AIDS control programmes.

In this respect, the discussion will be divided into three main points: 1) outputs for ACP; 2) outputs for TBCP; and 3) outputs for programme integration.

The study gave relevant information on knowledge, attitude and practice about AIDS, confirming the results of similar small surveys performed in Uganda [17]. A possible limitation of our study was that, due to the relatively high costs and lack of similar studies in the literature, the reproducibility of the questionnaire was not tested.

Mass media appear to be the main sources of information among students. This may not be completely true in rural areas, where other sources (church leaders, school and health personnel) are probably playing an important role. In this respect, a United Nations Children's Fund (formerly United Nation's International Children's Emergency Fund (UNICEF)) survey performed in Arua district [18] surprisingly showed that about one third of Ugandan families living in rural areas possess a radio. Thus, our approach based on HE appears to be appropriate. Misconceptions about transmission are low among students. However, the fact that a large portion of students still consider AIDS as a distant problem is, in our opinion, an alarming issue. The finding that HE did not improve knowledge on the preventive role of condoms appears to be crucial, since ACP policy is strongly condom-oriented [11]. Further studies on this topic are encouraged. According to our findings, younger students and women appear to have higher risk behaviour for AIDS. It should be noticed that, in the district, literacy rate was 76% in males and 44% in females [19].

In a country with limited resources, the cost of mass HE campaigns may be prohibitive, and therefore the identification of the above-mentioned target groups could increase the cost-effectiveness of the intervention. Postprimary students represent a good target for the following reasons: 1) they are sexually active [4], although their HIV seroprevalence is probably very different from country to country; 2) they are in the position to spread their knowledge, becoming themselves Health Educators in their own areas ("training of trainers" approach); and 3) the organization of HE campaigns at school level is cheap [20].

In order to reach a not yet infected target, a HE campaign in primary schools has been planned [10]. Particular attention should be paid to improve the education of women through women's clubs and associations. Moreover, religious leaders and health staff have been involved in the last 4 yrs in specific training, to enable them to convey the message to the general public. The significant improvement in knowledge achieved by HE could hopefully result in a reduced risk behaviour. An evaluation of the future impact of our effort in reducing HIV spread will be carried out by analysing the age-specific rates of HIV positive/AIDS patients in the years to come.

Although the improvement of TB case-finding in the period following the study might be accidental, we assumed it was a consequence of HE, since no systematic increase in TB case-detection was previously observed in the district during spring time. Under this hypothesis, the "training of trainers approach" gave positive results in TBCP activities, but we are aware that the emotional involvement might explain similar data in the short-term, without apparent benefits in the long-term. We are convinced that, together with the cure rate improvement (to be achieved by adopting rifampin-containing short-course regimens), the programme efficiency might improve if resources are invested into HE activities [8, 16]. A recent study, performed in the same area, showed higher cure and compliance rates in public health services than in private ones, where low priority to patients' motivation/education was given [16]. If social mobilization is essential to achieve TB control, a continued educational effort specifically directed towards future leading classes will probably result in positive effects [21].

Several reasons justify the recommended integrations between ACP and TBCP [11]: 1) the similarities and connections between chronic, preventable, infectious diseases; 2) the HIV/TB mutual strengthening in determining deterioration of the epidemiological situation; and 3) the need to optimize health resources in low income countries. The main points where integration efforts should concentrate appear to be epidemiological surveillance [4, 22], personnel training, financial requirements, drug/facilities supply, HE, services integration, and programme evaluation. In our experience, the KAP study represented the opportunity to improve (with different degrees of importance) the existing integration of the abovementioned key-points.

At regional level, a TB/AIDS referral unit (consisting of a referral laboratory, ambulatory and ward) was implemented [4] to manage TB diagnosis, treatment, follow-up, data collection and AIDS diagnosis, treatment, follow-up, data collection and counselling. The present study offered the opportunity to evaluate the work of a stable ACP/TBCP team (under the co-ordination of the District Medical Office), that was responsible for the integrated activities of the referral centre and of the training of different categories of health personnel. Particular efforts should be paid to improvement of sterilization standards, particularly where the streptomycin-containing long-course regimens are still used to treat TB [23]. Whilst ACP/TBCP integration appears easier to achieve at local level, the possibility of creating contacts at national level depends on the historical background and on the pre-existing level of integration between the different health programmes. In particular, while ACP was organized in different countries with vertical structure and relevant financial inputs, TBCP is generally a long-lasting programme (often integrated into Primary Health Care), with limited financial resources.

The aim of our study was to assess knowledge, attitudes and practice towards AIDS, to identify target groups for HE, to evaluate the impact of HE, to circulate correct information on AIDS and TB through target groups, and to evaluate the integration of AIDS and TB control activities. The study produced information on knowledge about AIDS, target groups for HE, impact of HE, TB case-finding and programme integration. Furthermore, it represents a low cost initiative aimed at utilizing Health Education within integrated infectious disease programmes in developing countries, where the fight against the "cursed duet" requires immediate co-ordination among health services, administrators and politicians [1].

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