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Impact of health education interventions on nurses' knowledge, attitudes, and perceptions towards HIV/AIDS in Cairo University, Egypt

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Information education and communication (IEC) programs are the most effective available approaches for combating the HIV pandemic especially among nurses. The aim of this study is to assess knowledge, perceptions and attitudes towards HIV/AIDS before and after an IEC intervention program. The study used a prospective interventional design that was conducted on two different nursing groups: post-graduate nursing staff (67 nurses) and undergraduate nursing students (73 students). A significant improvement in the general knowledge and perceptions score was observed (from 7.29 ± 1.2 to 8.01 ± 1.5 with $P < 0.001$). The intervention also succeeded to improve the mode of transmission knowledge score significantly from 6.83 ± 0.9 to 7.21 ± 0.8 ($P < 0.001$). Furthermore, the intervention significantly improved the prevention knowledge score. The main source of information was television (66.7%). Although favorable attitudes increased after the intervention it did not reach the desired level. A planned HIV/AIDS education program significantly improved the HIV/AIDS knowledge, and to a lesser extent the perceptions and attitudes toward patients with HIV/AIDS. Further structured education should be conducted emphasising the role of mass media.

Key words: HIV/AIDS, knowledge, perceptions and attitudes, health education intervention.

INTRODUCTION

Since its emergence in 1981, the HIV pandemic has become one of the most serious infectious disease challenges to public health. Entering its' third decade, virtually every country is affected by it. Estimates of 2008 report showed that there are 33.4 million people living with HIV (PLWHA), 2.7 million new infections, and 2 million HIV – related deaths worldwide (UNAIDS, 2008).

Egypt is considered to have a low HIV prevalence, with estimates of less than 1% of the population as HIV-positive. However, unsafe behaviors among at-risk populations set Egypt at risk of a broader epidemic. In 2008, there were 510 deaths attributed to HIV/AIDS and

9,200 PLWHA, in Egypt (UNAIDS/WHO, 2008). By the end of 2009, the National AIDS Program (NAP) reported 3,919 HIV cases detected in Egypt, of which 2,920 were Egyptians. Among these, 1078 (27.5%) developed AIDS (National AIDS Program, 2008).

Since 1990 and till date, the number of detected cases has shown an exponential increase mounting to 268%. In the past decade alone, there was an increase by 120% (1,040 HIV and AIDS cases from 2001 to 2005 and 1,255 cases from 2006 to 2009). This perceived increase of HIV positive cases may be partially explained by the efforts of the NAP to improve HIV testing and reporting (National AIDS Program, 2008).

In most developing countries, the lack of universal adherence to infection control protocols, such as injection safety, poses a great risk for healthcare workers of occupational HIV infection at virtually every level of their daily work (Kermode, 2004; Nsubuga and Jaakkola, 2005; Ehlers, 2006). The duties of the nursing staff include collecting body samples (blood, urine, stool, sputum, etc.) from both out-patients and in-patients,

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Abbreviations: IEC, Information education and communication; HIV, human immune deficiency virus; AIDS, acquired immune deficiency syndrome; PLWHA, people living with HIV/AIDS.

administering oral, intravenous or intramuscular medication, in addition to cleaning patients and changing their bedding. Such activities are usually performed with no barrier protections putting both patients and health care workers at risk (Mbanya et al., 2001).

Several studies have explored HIV/AIDS knowledge, attitudes and practices (KAP) of healthcare workers in developing countries. Results revealed existence of anxiety and fear of contagion accompanied by lack of knowledge on HIV transmission and methods of prevention (Mbanya et al., 2001; Walusimbi and Okonsky, 2004; Oyeyemi et al., 2006). Nurses attitudes towards patients with HIV/AIDS have been shown to indicate negative and discriminatory behaviors (Mbanya et al., 2001; Oyeyemi et al., 2006; Reis et al., 2005), while fewer studies have pointed to more empathic attitudes (Walusimbi and Okonsky, 2004).

The lack of a vaccine or cure for HIV/AIDS makes information, education and communication (IEC) programs the only available approach for combating the pandemic (International Institute for Educational Planning/UNESCO, 2003). The positive impact of these programs on HIV/AIDS KAP has been previously reported (Uwakwe, 2000; Ezedinachi et al., 2002). It is imperative for nurses to be knowledgeable about HIV/AIDS transmission, prevention and treatment in order to maintain quality of care while coping with a universal increase in workload (Mazloomly and Baghianimoghadam, 2008).

No empirical data exists on the knowledge and attitudes of nurses towards HIV/AIDS at Kasr El Aini Teaching Hospital of Cairo University. Hence the aim of this study was to assess the basic knowledge of these nurses as regard HIV/AIDS and its available services in Egypt as well as their attitude towards HIV/AIDS and PLWHA, in order to identify training needs. Furthermore, the study sought to implement and evaluate the effectiveness of an education program regarding HIV/AIDS on their change in knowledge, and attitude.

METHODS

Study participants and setting

Two different nursing groups were included in this study. The first group consisted of post-graduate nursing staff (67 nurses) working in different departments of Kasr El Aini Teaching Hospital, of Cairo University and registered for post-graduate diploma, in their nursing specialties, at the nursing school of Cairo University. The second group was composed of the undergraduate nursing students (73 students in their first year) from the Technical Institute of Nursing (TIN) of Cairo University. This group joins TIN after finishing their secondary level of formal education for a period of three years.

Sampling technique

All the post-graduate nurses registered for a diploma were approached (n = 75) and asked to fill the anonymous study questionnaire in a voluntary manner. Only 67 questionnaires were

returned at baseline, with a response rate of 89%. Among the undergraduate nurses (n = 80), only 73 returned their baseline questionnaire, with a response rate of 91%. All study participants, whether included in the study or not, were given the health education intervention during their classes.

Study design

The study used a prospective design, where participants' knowledge, attitudes and perceptions towards HIV/AIDS were assessed at baseline. Then a health education intervention was implemented followed by a post – intervention assessment.

The intervention

The health education intervention was in the form of a series of lectures combined with active group participation over a period of two weeks (four hours/week) for each group. Educational materials used were; brochures, videos, power point presentations and group discussion cases and questions. At the start of the sessions, students were asked if they approved to participate (in an anonymous manner) by completing a self-administered pre-test questionnaire to be followed by another post-test questionnaire to be completed at a later date. After two months following the intervention a post-test was undertaken by using the same interview questionnaire that was used in the pre-test. All respondents who originally participated at the beginning of the study participated in the post-test.

Assessment of the intervention

Participants' assessments were conducted using a pre-tested anonymous self-administrated questionnaire. The content validity of the questionnaire was established by literature review and expert reviewers. Reliability of the questionnaire was established through test-retest at a three week interval period which yielded a Pearson's correlation coefficient of 0.81. Each student was asked to select a code consisting of 5 characters (number, letters, symbols etc.), and to use the same code each time the questionnaire is completed.

The questionnaire contained the following sections: Age of participants, knowledge of HIV/AIDS which consisted of general knowledge (9 questions), modes of HIV infection (9 questions), and prevention of HIV infection (6 questions). Attitude towards an HIV infected patient was also assessed by 3 questions. The possible responses to all assessment questions were yes, no or don't know. After data collection items were scored as 1 (correct), and 0 (for other responses according to the questions). The overall score was calculated by adding the scores from all knowledge questions. Overall knowledge scores ranged from 0 to 24 (0 to 9 for general knowledge, 0 to 9 for mode of transmission, 0 to 6 for modes of prevention). The attitude score ranged from 0 to 3. Other questions included were those on sources of participants' knowledge as well as knowledge of available health services for HIV/AIDS in Egypt. These last questions were not scored.

Statistical analysis

All data were entered using the Statistical Package for the Social Sciences, Version 15 (software (SPSS Inc, Chicago, IL)). Responses to all the items were converted to a percentage indicating the proportion of correct responses versus other responses. The qualitative data were presented as frequencies and percentages. The calculated scores were presented as mean and standard deviation (SD) after checking for normality in distribution.

The McNemar test was used to compare paired qualitative data, while the paired t-test was used to compare paired quantitative data within each group. Comparison between groups (before and after intervention) was done using Chi square test for qualitative variables and student's t test for quantitative variables. A *P*-value of ≤ 0.05 was considered significant.

Ethical considerations

Ethical approval and administrative permissions for the study were obtained prior to data collection from the selected study settings. Participants were assured of the confidentiality of their responses (since data was collected in anonymous forms) and provided informed verbal consent. Data was preserved confidentially throughout the study in accordance with the Declaration of Helsinki.

RESULTS

Of the 140 participants enrolled in this study, 73 were undergraduates and 67 were post-graduate nurses. The mean age of the postgraduate nurses was 30.07 ± 6.75 years (range from 20 to 50 years) while that of undergraduates was 16.18 ± 0.98 years (range from 16 to 19 years).

The overall general knowledge about the diseases was considered to be good among the study participants. Following the intervention, more significant improvement in the general knowledge score was observed ($P < 0.001$) among all study participants (from 7.29 ± 1.2 to 8.01 ± 1.5). Significant improvement in the general knowledge score within each group was also detected. Additionally, a significant difference existed between both groups in the pre and post results with higher scores recorded among the undergraduates (7.79 ± 1.14 vs. 6.7 ± 1.6 and 8.24 ± 1.2 vs. 7.74 ± 1.3 among the undergraduates vs. postgraduates respectively) with *P*-values of 0.02 and < 0.001 respectively (Table 1). Among all respondents, 88.6% knew that HIV/AIDS is caused by a virus that attacks the immune system. Nearly 80% of the respondent knew that the abbreviation "AIDS" stands for Acquired Immune Deficiency Syndrome. By comparing both groups we found a significant difference between them at baseline ($P = 0.01$) and post intervention ($P = 0.01$) being highest among post-graduates (75.3 vs. 86.1% and 75.3 vs. 91%, respectively) as shown in Table 1.

Some misconceptions were identified among the participants. Slightly over two thirds of them (68.6%) thought that an HIV infected person looks tired and ill. This figure was reduced to 42.9% after the intervention. However the main difference was detected among the post-graduate nurses ($P < 0.001$), while no effect was detected among the undergraduate group. Additionally, 81.4% incorrectly believed that there is a cure for AIDS. This perception showed a significant improvement to reach 55.8% especially among the undergraduate nurse (from 80.8 to 53.4% after our intervention – $P < 0.001$). However, no difference was found among the

post-graduate nurses ($P = 0.22$). On the other hand, only 7.1% of all participants knew that it is the most devastating disease of the century. Significant doubling of this percentage was detected after the intervention (15.7%) ($P = 0.03$). Another misconception was identified, as 92.1% of all participants thought that the disease is not present in Egypt. This notion was reduced significantly by the intervention to show an increase in the percent of correct responses, from 4.1 to 39.7% ($P < 0.001$) among undergraduates and from 11.9 to 29.9% among the post-graduates ($P = 0.03$) (Table 1).

Most respondents seemed to know the correct ways of HIV transmission, especially through infected blood (100%), as well as sharing of syringes and sharps with no difference between groups or within each group before and after the intervention (Table 2). However, surprisingly, more than 26 and 9% of the undergraduates and post-graduates respectively did not know about the sexual mode of transmission with a highly statistical significant difference between groups ($P = 0.007$). The intervention decreased these percentages to 9.6 and 6% respectively with no difference between groups after the intervention. The intervention significantly improved this understanding among the undergraduates as shown by increase in the correct response from 74 to 90.4% ($P = 0.008$) but showed no effect on post-graduates. Overall, 63.6% did not know that a woman with HIV can transmit it to her baby through lactation. This percentage decreased to 6% after the intervention. Furthermore, some respondents incorrectly thought that certain activities can transmit HIV, for example nearly half of responding subjects (52.9%) believed mosquitoes can transmit HIV and almost the same percent believed that sharing utensils with infected person can transmit the infection. The health education intervention succeeded to improve the knowledge as regards transmission though lactation especially among undergraduates (significant improvement from 47.9 to 94.5% and from 23.9 to 94% in the undergraduates and post-graduates respectively – $P < 0.001$). Furthermore, a significant improvement as regards transmission by mosquito bite was detected among all participants (from 52.9% in pre-test to 27.2% in the post-test – $P = < 0.001$) especially among post-graduate nurses only (increase in correct response from 47.8 to 89.6% $P < 0.001$). On the other hand, 42.5 of undergraduate still believed in HIV transmission by mosquito bite. The health education intervention significantly improved the findings of the item on sharing utensils in both groups. Mode of transmission overall knowledge score showed a statistically significant increase in both groups (from 6.99 ± 0.9 to 7.4 ± 0.9 in the under graduates and from 6.99 ± 0.7 to 7.0 ± 0.6 in the post graduates). A significant difference was detected while comparing both groups in the pre and post intervention ($P = 0.02$ and 0.004 respectively). Higher scores were observed among the undergraduate nurses (Table 2).

Although, most respondents can correctly select the HIV prevention methods, some often select incorrect ones as well. Nearly all respondents knew that not sharing

Table 1. Comparison of correct responses, among study participants, regarding general knowledge about HIV/AIDS.

| General knowledge question | Undergraduate nurses (N = 73) | | Post-graduate nurses (N = 67) | | P ₁ value | P ₂ value |
|---|-------------------------------|--------------------|-------------------------------|--------------------|----------------------|----------------------|
| | Pre-test N (%) | Post-test N (%) | Pre-test N (%) | Post-test N (%) | | |
| AIDS is not curable but treatment exists to improve quality of life. P value | 14 (19.2) | 34 (46.6) | 12 (17.9) | 19 (28.4) | 0.51 | 0.02 |
| | | < 0.001 | | 0.22 | | |
| AIDS stands for anti infectious disease situation. P value | 57 (78.1) | 67 (91.8) | 55 (82.1) | 56 (83.6) | 0.21 | 0.07 |
| | | 0.04 | | 0.97 | | |
| AIDS stands for acquired immune deficiency syndrome. P value | 55 (75.3) | 55 (75.3) | 59 (86.1) | 61 (91) | 0.01 | 0.01 |
| | | 1.00 | | 0.79 | | |
| AIDS is caused by a virus that attacks the immune system. P value | 63 (86.3) | 63 (86.3) | 61 (91) | 63 (94) | 0.32 | 0.11 |
| | | 1.00 | | 0.73 | | |
| An HIV infected person always looks tired and ill P value | 39 (53.4) | 41 (56.2) | 5 (7.5) | 39 (58.2) | 0.34 | < 0.001 |
| | | 0.87 | | < 0.001 | | |
| AIDS affects people who leave an immoral life. P value | 55 (75.3) | 62 (84.9) | 58 (86.6) | 65 (97) | 0.49 | < 0.001 |
| | | 0.25 | | 0.065 | | |
| AIDS is not present in Egypt. P value | 3 (4.1) | 29 (39.7) | 8 (11.9) | 20 (29.9) | 0.07 | 0.14 |
| | | < 0.001 | | 0.03 | | |
| AIDS is the most devastating disease in the century. P value | 6 (8.2) | 15 (20.5) | 4 (6) | 7 (10.4) | 0.42 | 0.07 |
| | | 0.08 | | 0.54 | | |
| AIDS only affects gay people. P value | 5 (6.8) | 12 (16.4) | 2 (3) | 22 (32.8) | 0.25 | 0.01 |
| | | 0.118 | | < 0.001 | | |
| General knowledge score (mean ± SD) P value | 7.79 ± 1.1 | 8.24 ± 1.2 | 6.76 ± 1.6 | 7.74 ± 1.3 | 0.02 | < 0.001 |
| | | 0.017 | | 0.001 | | |

P₁ between groups in pre-test, P₂ between groups in post-test.

knew that not sharing syringes is a method of prevention and most knew that having sex with only one uninfected and faithful partner and correctly using a condom were correct modes of prevention.

Nevertheless, this still leaves 22.1% ignorant to the fact that having one uninfected and faithful partner can prevent HIV and 33.5% of participants were unaware that always using a condom

correctly when having sex can prevent HIV. The health education intervention improved the correct responses of those items to 85.7 and 87.1%, respectively. Very interestingly, almost more than 1/3

Table 2. Comparison of correct responses, among study participants, concerning HIV/AIDS mode of transmission.

| Mode of transmission question | Undergraduate nurses (N = 73) | | Post-graduate nurses (N = 67) | | P ₁ value | P ₂ value |
|---|-------------------------------|--------------------|-------------------------------|--------------------|----------------------|----------------------|
| | Pre-test N (%) | Post-test N (%) | Pre-test N (%) | Post-test N (%) | | |
| Receiving an HIV infected blood P value | 73 (100) | 73 (100) | 67 (100) | 67 (100) | - | - |
| Bitten by a mosquito P value | 34 (46.6) | 42 (57.5) | 32 (47.8) | 60 (89.6) | 0.51 | < 0.001 |
| Having sex with any one without using a condom P value | 54 (74.0) | 66 (90.4) | 61 (91) | 63 (94) | 0.007 | 0.32 |
| Touching person living with HIV P value | 63 (86.3) | 67 (91.8) | 60 (89.6) | 63 (94) | 0.44 | 0.15 |
| 5-Sharing utensils with person living with HIV P value | 16 (21.9) | 45 (91.6) | 45 (67.2) | 61 (91.2) | < 0.001 | < 0.001 |
| Reusing someone else's syringe P value | 67 (91.8) | 71 (97.3) | 64 (95.5) | 62 (92.5) | 0.29 | 0.19 |
| By smoking or snorting drugs P value | 53 (72.6) | 57 (78.1) | 56 (83.6) | 56 (83.6) | 0.08 | 0.27 |
| From mother to her baby P value | 70 (95.9) | 72 (98.6) | 60 (89.6) | 67(100) | 0.13 | 0.52 |
| From mother to her baby through lactation P value | 35 (47.9) | 69 (94.5) | 16(23.9) | 63 (94) | 0.03 | 0.59 |
| Mode of transmission score (mean ± SD) P value | 6.99±0.9 | 7.4 ± 0.9 | 6.66 ± 0.7 | 7.0 ± 0.6 | 0.02 | 0.004 |

P₁ between groups in pre-test, P₂ between groups in post-test.

of all the respondents thought that showering, not eating food sold on the street and not smoking can prevent HIV infection. Those misconceptions were corrected significantly by the intervention in

both groups although no statistical significance was detected within each group except for the item on sold food on the street, where the intervention was positive among the undergraduate

group (P = 0.006). The intervention significantly improved the prevention knowledge score among entire participants from 5.06 ± 1.1 to 5.39 ± 0.8 (P< 0.001). Additionally, the mean score of

Table 3. Comparison of correct responses, among study participants, regarding HIV/AIDS modes of prevention.

| Methods of prevention questions | Undergraduate nurses (N = 73) | | Post-graduate nurses (N = 67) | | P ₁ value | P ₂ value |
|---|-------------------------------|--------------------|-------------------------------|--------------------|----------------------|----------------------|
| | Pre-test N (%) | Post-test N (%) | Pre-test N (%) | Post-test N (%) | | |
| Using new syringe P value | 71 (97.3) | 71 (97.3) | 62 (92.5) | 67 (100) | 0.27 | 0.19 |
| Having sex only with your faithful partner P value | 53 (72.6) | 62 (84.9) | 56 (83.6) | 58 (86.6) | 0.08 | 0.49 |
| Not smoking cigarettes P value | 49 (67.1) | 57 (78.1) | 50 (74.6) | 52 (77.6) | 0.28 | 0.85 |
| Not eating food sold on the street P value | 43 (58.9) | 59 (80.8) | 48 (71.6) | 52 (77.6) | 0.08 | 0.35 |
| Always using condom when you having sex P value | 45 (61.6) | 62 (84.9) | 48 (71.6) | 60 (89.6) | 0.14 | 0.28 |
| Taking a shower once a day P value | 51 (69.9) | 58 (79.5) | 39 (58.2) | 49 (73.1) | 0.10 | 0.24 |
| Methods of prevention score (mean ± SD) P value | 5.14 ± 0.6 | 5.42 ± 0.9 | 4.97 ± 1.4 | 5.43 ± 0.6 | 0.95 | 0.37 |

P₁ between groups in pre-test. P₂ between groups in post-test.

prevention knowledge significantly increased within each group separately (from 5.14 ± 0.6 to 5.42 ± 0.9 in under graduates, and from 4.97 ± 1.4 to 5.43 ± 0.6 in post-graduates), but not between groups (Table 3).

Any information a participant may have received on HIV/AIDS was found to be from television (66.7%) and reading material such as magazines and newspaper (50.7%). The latter showing a significant difference between groups being

highest among the undergraduates (P < 0.001). The health institutes (Nursing school and TNI) also play a significant role as a source of information, especially among the undergraduates with affirmative responses of 52.1% among undergraduates vs 35.8% among post-graduates (P = 0.03). Religious and web sources were the least likely sources of information on HIV/AIDS among the two groups (13.2 and 9%, respectively) with no difference between the two groups (Figure 1).

It is to be mentioned that only 6.9% of all respondents knew where to go for HIV/AIDS services. This percent increased significantly to reach 40% after the intervention.

However, when it comes to understanding about PLWHA and consequently, attitudes towards them, the responses are somewhat worrisome. Overall, most participants (75.7%) would not feel comfortable sharing an office with a person living with HIV/AIDS. This finding significantly improved

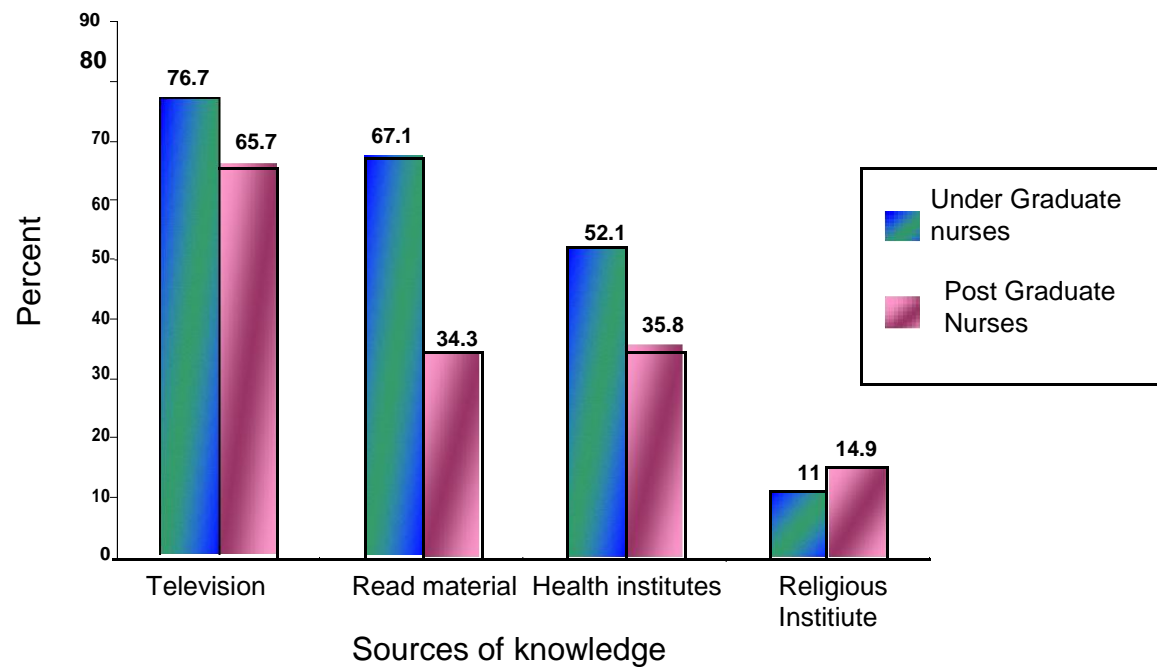


Figure 1. Sources of knowledge among the studied groups.

Table 4. Comparison of attitudes towards HIV/AIDS among study participants.

| Attitude questions | Undergraduate nurses (N = 73) | | Post-graduate nurses (N = 67) | | P ₁ value | P ₂ value |
|---|-------------------------------|--------------------|-------------------------------|--------------------|----------------------|----------------------|
| | Pre-test N (%) | Post-test N (%) | Pre-test N (%) | Post-test N (%) | | |
| HIV infected patients are allowed to school or work P value | 17 (23.3) | 29(39.7) | 16 (23.9) | 26(38.8) | 0.56 | 0.27 |
| Felling comfortable sharing office with a colleague infected person P value | 16 (21.9) | 30(41.1) | 18 (26.9) | 29(43.3) | 0.38 | 0.37 |
| Felling legally and or morally obliged to report a colleague infected person P value | 41 (56.2) | 7(9.6) | 45 (67.2) | 6(8.9) | 0.07 | 0.33 |

P₁ between groups in pre-test, P₂ between groups in post-test.

Table 5. Comparison of overall knowledge and attitude scores among the study participants.

| Total scores | Undergraduate nurses (N = 73) | | Postgraduate nurses (N = 67) | | P ₁ value | P ₂ value |
|-------------------------|-------------------------------|------------------------|------------------------------|------------------------|----------------------|----------------------|
| | Pre-test Mean ± SD | Post-test Mean ± SD | Pre-test Mean ± SD | Post-test Mean ± SD | | |
| Overall knowledge score | 20.4 ± 1.7 | 20.6 ± 2.1 | 19.2 ± 1.9 | 19.4 ± 1.9 | 0.02 | < 0.001 |
| P value | 0.08 | | 0.71 | | | |
| Attitude score | 2.09 ± 0.4 | 2.27 ± 0.4 | 2.09±0.3 | 2.37 ± 0.5 | 0.99 | 0.22 |
| P value | 0.12 | | < 0.001 | | | |

P₁ between groups in pre-test, P₂ between groups in post-test.

after the intervention within each group (but not between groups) with a rise of 19.2 and 16.4% in the undergraduate and post-graduate groups respectively. Similarly, 76.5% of all participants did not think that people living with HIV/AIDS should continue working in their organization or go school. This finding improved significantly after the intervention by 16.4% in the undergraduate group and by 14.9% in the post-graduate group. Most participants felt obliged to report PLWHA with 56.2% of undergraduates and 67.2% of post-graduates feeling obliged to do so. This finding also improved significantly after the intervention within groups (Table 4). Almost all respondents (97%) do not know anyone living with HIV/AIDS.

The total knowledge score showed a significant improvement within the groups after the intervention among undergraduates as well as a significant difference between groups. Higher scores were detected among the undergraduates than post-graduates (20.4 ± 1.7 vs 19.2 ± 1.9, respectively in the pre-test and 20.6 ± 2.1 vs.19.4 ± 1.6 respectively in the post-test). Although, favorable attitudes increased after the intervention but it did not reach the desired level. A slight significant improvement in the attitude score among post-graduates was detected (from 2.09 ±

0.3 to 2.37 ± 0.5). However, no significant difference was detected between the groups (Table 5).

DISCUSSION

The present study aimed to assess knowledge, and attitudes towards HIV/AIDS among undergraduate nursing students and post-graduate nursing staff at Kasr El Aini teaching hospitals of Cairo University. The study was also seen as an opportunity to provide lacking information and correct misconceptions about different aspects of HIV/AIDS among these groups. Our study confirmed the success of the intervention in improving the knowledge and favorable attitudes among the respondents with varied levels of significance. In general, the undergraduate group seemed to have benefited better than the post-graduate nurses as they exhibited better acquisition of knowledge after the intervention. Better knowledge detected among the undergraduates is related to more readiness in accepting information and recalling it than the post-graduates who were older and more preoccupied in their work.

The studied groups exhibited good general knowledge about HIV. The findings indicate

that the majority of the respondents were aware of the nature of HIV/AIDS. Similar finding were reported by Wong et al. (2008) in their cross sectional study in Malaysia among adults aged from 15 to49 years. The mean (± SD) and median of the total correct general HIV/AIDS knowledge scores of all respondents on a 7 item test were 4.6 ± 1.4 and 5.0, respectively. In agreement with this, are findings of Ayranci (2005) in his population-based study on AIDS knowledge, attitudes and misconceptions among the general population in Eskisehir, Turkey that involved 1048 participant aged 11 to 83 years. This study demonstrated a proper level of general knowledge among their respondents as indicated by a total mean score of general knowledge of 4.6 and 5 out of 7 points, respectively.

However, in our study, a need for improvement was detected at baseline, as a considerable percentage (81.4%) incorrectly believed that there is a cure for AIDS and that persons living with HIV can be recognized by appearance (68.6%). The main problem with those who are unaware that an HIV-infected person may be asymptomatic is that they are more at risk because they are unaware that they could be infected by an apparently healthy individual (Sarker, 2005). These findings

are much higher than those reported by others as Wong et al. (2008) who reported 18.1%, Ayranci (2005) who reported 30% and Hayyawi et al. (2010) who conducted their study in Baghdad, Iraq and included 335 adult respondents of both sexes and mean age 28 ± 8 years. They reported that 54.9% of their respondents thought that there is a cure for AIDS. Additionally, Wong et al. (2008) and Ayranci (2005) reported that 28.7 and 39.2% of their participants thought that HIV infected persons could be recognized by appearance. Our intervention improved these misconceptions which were reduced to 55.8 and 42.9%, respectively but despite this they are still higher than those of previous studies and still need further educational interventions especially for the post-graduates who lack any in-service training and refresher courses.

Proper knowledge regarding possible routes of transmission is not only crucial for decreasing the infection rate, but it is also important to dispel persistent myths as partial knowledge can further prolong the risk of infection (Babakian et al., 2004). A majority of respondents in our study gave correct responses about the methods of transmission and ways of prevention of HIV, especially regarding, infected blood, sharing of syringes and sharp instruments which agree with findings of other studies (Wong et al., 2008; Hayyawi et al., 2010; Al-Mazrou et al., 2005). However, surprisingly, more than 26 and 9% of the undergraduates and post-graduates respectively did not know about the sexual mode of transmission. This may be due to cultural reserve in discussing sex which is demonstrated by higher percentages among the undergraduate nurses, who are still unmarried. The intervention decreased these percentages to 9.6 and 6%, respectively being highly significant among the undergraduates. Matched with our results, are those reported by Bhosale et al. (2010) which was conducted among the adolescent school and junior college nurses students in India and involved 1024 participants with the majority aged 14 to 17 years. They demonstrated that 30% of the nurses under study, did not know about this method and this was reduced to 16% after the intervention.

The study revealed that there were some important misconceptions among the respondents regarding the mode of transmission. Nearly half of them, from both groups, believed that HIV can be transmitted by a mosquito. Other studies have also found a prevalence of this misconception among nurses (Bhosale et al., 2010), young adults (Tung et al., 2008), adults (Tan et al., 2007) and in the older populations (Hillman, 2008). In our study, this misconception was removed to some extent by the intervention package to reach 27.2% which exceeds results of Bhosale et al. (2010) who showed that 37% of the respondents still harbour this myth after the intervention. Another misconception that can adversely affect attitudes towards PLWHA was that some respondents believed that HIV can be transmitted by sharing utensils. Similar finding was obtained by Hayyawi

et al. (2010) which exhibited a percentage of 56.7% among adults in Iraq. This misconception was significantly reduced in the present study to be 24.3% by effects of the health education intervention. In India, Bhosale et al. (2010) reported that more than 10% of junior nurses had this misconception at baseline but this was reduced to less than 7% by their intervention.

It was also of concern that 63.6% of the post-graduate nurses were unaware that HIV could be transmitted through breastfeeding. Our results are comparable to Sharma's study (2008). This study was conducted in Nepal and recruited 67 adults of both sex aged 20 to 50 years. This study reported a figure of 85.1%. Similar finding was obtained by Hayyawi et al. (2010) which report 62.5%. This percentage was improved after our intervention to be 6% which is in concordance with the percentage reported by Sharma (7.5%) after their intervention. The health education intervention succeeded to improve significantly the mode of transmission knowledge score which is matched also with findings of Sharma (2008).

As regards prevention, most of our respondents knew the possible methods of prevention. However some misconceptions were discovered and they were improved by our intervention. The mean score of prevention knowledge was improved significantly after the intervention and this is in concordance with findings reported by Wong et al. (2008).

In contrast to other studies which demonstrated that high education level was associated with higher knowledge scores about HIV (Ayranci, 2005; Hayyawi et al., 2010; Eshetu et al., 2004), our study revealed that better overall knowledge scores were recorded among the undergraduates than among post-graduates. The underlying reason for this may be attributed to the fact that younger generations are probably introduced to the subject in their academic curriculum. Additionally, their readiness to accept and retain the information is much greater than the working nurses who are overloaded by their work and social duties that do not give them enough time to update their knowledge periodically. An inverse relation between age and knowledge has been reported by others (Mbanya et al., 2001; Umeh, 2008). Educational efforts need to be targeted at those who are most misinformed to meet the needs of different populations.

Mass media, especially the visual, is an accessible, widespread and effective means of knowledge dissemination. The messages provided from this media about sexually transmitted diseases should match our social norms and religious values. Taking everything into account, the media should implement new methods for AIDS education in order to improve public knowledge of HIV/AIDS. Local television and satellite channels represented the main source of information about HIV/AIDS in this study, while reading material in the form of magazines and newspaper, ranked second. Our results agree with the findings of studies conducted in Iraq (Wong et al., 2008), Turkey (Ayranci, 2005), Cameroon

(Hayyawi et al., 2010), and Malaysia (Mbanya et al., 2001), but disagree with a study conducted in Saudi Arabia in which friends were the main source of information for males and booklets for females (Al-Mazrou et al., 2005). Internet was the least reported source of information (17%) due to inaccessibility in many areas as well as its high cost of provision in addition to lack of proper training on use of the different web sites. A similar study conducted in the Eastern Mediterranean region involved a total 53 respondents from 17 countries out of the 23 Eastern Mediterranean countries. Among the participants there were 15 national AIDS programme managers or their assistants, 7 NGO representatives, 26 participants from international agencies and 5 from related sectors. This study demonstrated that 15.1% of the respondents reported that internet is not an appropriate source of information to them (Tawilah et al., 2002).

Negative attitudes towards HIV-positive individuals at school and at work were observed in our study, although the post-graduate group was more accepting towards contact with HIV-positive individuals than undergraduates. However, even after the intervention more than half of our study sample overall would avoid HIV-positive individuals at work or in public. This result is in agreement with what others found in Iraq (Ayranci, 2005), Turkey (Hayyawi et al. 2010), Iran (Tavoosi et al., 2004) and India (Agrawal et al., 1999). A slight improvement in the attitude was observed after the intervention which is comparable with Tan et al. (2007) who conducted a study among 259 Chinese undergraduates. Reporting of PLWHA was also found to be high. According to the Egyptian law, all infectious diseases should be reported by health institutions to the national health authorities. However, individual reporting is discouraged. By the end of our intervention, the significant improvement in attitudes of both groups was detected to this question.

A very small percentage of our respondents knew where to go for HIV services as regard testing, counseling and treatment. The result is in contrast to that obtained by Wong et al. (2008) where nearly 90% of Malaysian adults know about this service. This reflects the defective role of mass media in dissemination of this information in spite of the presence of AIDS hotlines in Egypt where calls averaged around 1000 per month as reported by UNAIDS, (2000).

LIMITATIONS OF THE STUDY

Taken as a whole, findings of this study indicate that the health education intervention was effective in enhancing knowledge, perceptions and attitudes of participants towards HIV/AIDS. However, the question whether the effects of this intervention were maintained over time was not addressed in this study. An additional limitation includes the fact that many items in the questionnaire used, assessed participants recall of information. It was not possible to assess the degree to which this information

was applied in participants' actual work. Furthermore, the small sample size makes it impossible to generalize the study results outside of our institution.

Conclusions

The overall general knowledge about the diseases was considered to be good among the study participants, although most people showed negative attitudes at the beginning of our study. A planned HIV/AIDS education program significantly improved the HIV/AIDS knowledge, and to a lesser extent the attitudes toward patients with HIV/AIDS. Some misconceptions about HIV/AIDS were corrected through the health education intervention, as detected by the improved correct response rates. However, a small proportion still exists and needs to be addressed by other health education programs. Television was found to be the most important source of knowledge among our study participants.

RECOMMENDATIONS

Structured education in the form of school curricula, health talks/ seminars, in-service training, and continuous education should be targeted at the nursing staff.

The role of television channels should be emphasized in distributing accurate, active and effective messages to the population, especially the younger age groups, about sexually transmitted diseases. These messages should match our social norms and religious values.

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