

Knowledge and Perceptions of HIV/AIDS among High School Students in Jeddah, Saudi Arabia

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Abstract

The Middle East and North Africa (MENA) region has the world's third fastest growing AIDS epidemic, but data on HIV/AIDS from this region is considered scarce. In this study, we report a cross-sectional survey of knowledge of and attitudes to HIV and AIDS among 438 high school students in Jeddah, Saudi Arabia. This city is an international gateway with the highest HIV incidence in the country. The survey highlights both good awareness of HIV with regard to transmission by sexual contact and injection, and also deficiencies in knowledge about other routes of transmission. The data indicate substantial stigma associated with HIV/AIDS patients, consistent with other reports from the MENA region. These outcomes highlight a need for greater education on at least some aspects of HIV; they also provide a benchmark for future research and a basis for discussions of public policy towards HIV/AIDS awareness and education in Saudi Arabia.

Keywords: Attitudes; Awareness; Cross-sectional survey; Education; High school students; HIV; Knowledge; Jeddah; Saudi Arabia

Introduction

In 2014, 34.3 million people were infected with HIV, including 17.4 million women and 2.6 million children [1]. There were 1.8 million new cases and 1.0 million deaths. The World Health Organization Middle East and North Africa (MENA) region has the third fastest growing AIDS epidemic [2].

In the Kingdom of Saudi Arabia (KSA), the total number of HIV cases from 1984-2013 was estimated to be about 20,500 [3]. In 2013, 1777 cases were newly diagnosed, 79% of them aged 15-49 years [4]. Up to the end of 2012, HIV cases in KSA included 5,348 Saudis and 13,414 foreigners. According to a report released by the Saudi Ministry of Health, 96% percent of patients became HIV-positive through sexual intercourse, 2.5% through injection, and 1.5% by infection during pregnancy. More than 600 Saudi women were infected post-marriage and about 80% of infected women acquired the disease from their husbands [3]. The CIA World Fact book reports an overall HIV prevalence of <0.1% in the country, with 300 deaths annually [5].

Various factors are relevant to understanding risk, prevalence and knowledge of HIV/AIDS in KSA. Saudi Arabia is a conservative Islamic society. There is a lack of public health education and in-school education on matters related to HIV/AIDS. It may be taboo to discuss risk factors such as sexual practices and injected drug use. There may be gender-related differences in knowledge. In such circumstances, it is important to assess knowledge and understanding of HIV and AIDS among the young population as this group is crucial to preventing the spread of the disease [6]; 15-24 year olds account for 40%-50% of new cases globally [7]. It is also relevant to establish attitudes of the population to those infected with HIV/AIDS.

In this study, we report a cross-sectional survey of knowledge about and attitudes to HIV/AIDS among high school students in the city of Jeddah, KSA. Jeddah, population 3.4 million, is the second largest city in the country and a major port on the Red Sea; it is the major urban center of western Saudi Arabia. Jeddah is also a resort city and the principal gateway to Mecca, Islam's holiest city, which able-bodied Muslims are required to visit in pilgrimage at least once in their lifetime. Forty

percent of reported HIV cases in KSA are in Jeddah [8]. This relatively high prevalence compared to the rest of the country is believed to be due to the presence of a large number of expats, especially Africans [3]. Immigration from low-income/high-risk countries increases the risk of disease spread to the local population.

Data from the MENA region that is available includes a cross-sectional study undertaken in high schools in Erbil City, Iraq, in 2014, which assessed knowledge of HIV/AIDS against socioeconomic factors [9]. There was also a survey of 5000 illegal residents of KSA (published in 2015), around 40% (two thousand) of whom were living in Jeddah [10]. Knowledge of HIV transmission was poor in 90% of respondents, which represents at least a theoretical risk to those surveyed in the present work. A very brief report published in 2015 [11] surveyed adolescents (aged 16-19) in shopping malls in the Eastern Province of Saudi Arabia. Beyond this, data from Yemen [12] and KSA [13] are at least 10 years old and thus their continued relevance is unclear.

Aims of this Study

To survey knowledge of and attitudes to HIV and AIDS among high school students in the city of Jeddah, Saudi Arabia. Further, to assess the outcomes of the survey by demographic characteristics and the implications of the data for HIV/AIDS awareness and education.

Methods

Study design

A cross-sectional study was conducted among high school students in Jeddah, Saudi Arabia. Thirty-two questions were asked, divided into

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four categories: Questions concerning routes of transmission of HIV; general knowledge about HIV/AIDS; questions about preventative measures; and attitudes toward infected patients.

Sample characteristics

A total of 438 high school students were surveyed. Summary demographic information concerning the participants is given in Tables in the Supplementary material. The students were divided according to their location of residence between north Jeddah (n=168) and south Jeddah (n=270). Schools (n=8) were selected at random and students were randomly selected from within their schools. People from the north of Jeddah have a higher mean family income than people from the south. Students in the north group are considerably more likely to be receiving private (rather than governmental) education than those in the south group. On average, both parents of students in the north group had a higher level of education than parents of students in the south group. The mean age of the students surveyed in the groups was 15 ± 19 years (north) and 15 ± 19 years (south) (age range 15-26 years; 82% aged 15-19 years) and there was no statistically significant difference in age between the groups. Notably, there was no significant difference between the groups in the employment of the students' parents in medical work.

The response rate to the survey was 54.7%. The questionnaire was designed by Infectious Control Consultant at King Abdulaziz University Hospital and reviewed by Infectious Disease Consultant at King Abdulaziz University Hospital]. It was translated into Arabic, the language used in the schools, by an infectious disease control consultant, and retranslated by a native Arabic speaker; the English versions were compared and found to avoid mismatch. The survey was conducted from 30th August 2014 to 14th January 2015. Surveys were completed by individual students without communicating with others present.

Statistical analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences software. Chi-square tests were used to compare data. Differences were considered statistically significant at $P < 0.05$.

Statement on ethics

This study was approved by the Biomedical Ethics Committee at King Abdulaziz University Hospital. The purpose of the study was explained to all participants and informed consent was obtained verbally from both the participating students and their parents. Surveys were conducted anonymously and participants were assured of the confidentiality of their responses. Students were free to decline to participate in the survey.

Results

Routes of transmission of HIV

Table 1 shows the questions concerning routes of transmission of HIV and the responses obtained from the 438 students surveyed in Jeddah. Responses are subdivided into "north" and "south" according to the region of the city in which the student resided. Relative to the south, students in the north group had, on average, a higher level of family income, and both of their parents had a higher level of education (Supplementary Tables).

More than 93% of respondents considered that sexual contact is a route of transmission of HIV, with no significant difference between the north and south groups. Regarding transmission by oral sex, 74.4% of the south group considered this a route of transmission, whereas

this figure was 62.5% among the north group. There was a significant difference between the south and north groups concerning transmission by kissing; 60.9% from the south considered this a route of transmission, while the corresponding figure was only 43.5% among the north group. More than 23% of respondents in the south believed that shaking hands is a means of HIV transmission, and the corresponding figure was 32.7% in the north (26.9% overall). No significant differences were observed between the groups regarding shaving (sharing of razors) as a route of transmission; a total of 81.1% were aware of this route, while 90.8% (south) and 83.9% (north) were aware of sharing of needles as a transmission route.

No significant difference was observed in the response from the two groups concerning whether pregnancy is a means of HIV transmission (south 74.9%; north 67.9%). Half of both groups considered mosquito bites a means of transmission. There was a significant difference between the two groups concerning the use of public bathrooms: 53.1% of those in the south and 32.7% of those in the north regarded this as a transmission route. Sharing food with an infected person was considered a transmission route by 32.8% of the southern group and 22.0% of the northern respondents.

General knowledge about HIV/AIDS

Table 2 reports general knowledge about HIV/AIDS among the students surveyed. A large majority (78.6%) answered that HIV is a viral infection (rather than bacterial), without a significant difference between the north and south groups. Of the total, 49.2% thought that there is a vaccine against HIV (54.2% south, 41.1% north). Meanwhile, 81.3% of the total survey responded that there is no definitive treatment for HIV, without a significant difference between the groups. Regarding the existence of medications to prevent viral proliferation, 41.3% of the south group and 36.3% of the north group were not aware of these; 55.7% (south) and 64.3% (north) of respondents believed that there are medications to decrease the incidence of transmission from a pregnant woman to her fetus. Roughly half of the respondents in both groups considered AIDS to be common in Jeddah. Meanwhile, 37.8% answered that sexual contact is the only way for transmission, without a significant difference between the north and south groups; this result is perhaps surprising in light of the data (Table 1) concerning knowledge about sharing of needles and razors as a route of transmission.

Means to prevent HIV

Table 3 shows responses of the surveyed students to questions about means to prevent HIV/AIDS. There was no significant difference between the north and south groups in terms of considering the use of condoms (77.8% of the total) and sterilizing needles (82.6%) as means of reducing transmission. Similarly, both groups recognized the value of routine checkups (87% overall), without a significant difference between them. There was, however, a significant difference between the groups in considering whether isolation of infected people is a way to reduce the spread of the virus: 74.2% agreed in the south, but only 58.3% in the north. Around 56% of both groups answered that avoiding eating with an infected person is a way to reduce transmission of HIV, while 60.8% of the total number thought that avoiding using public bathrooms is way to reduce the spread of the virus, with a significant difference between south (65.7%) and north (53.0%).

Attitudes to HIV/AIDS patients

Table 4 shows data concerning attitudes toward infected patients. Overall, 61.5% of our survey participants would feel shy to ask an HIV patient about the mode of their infection. Approximately 23% of

| QUESTION | ANSWER | | SOUTH | NORTH | TOTAL |
|---|--------|----------------|-------|-------|-------|
| Is sexual contact considered a route of transmission? | Yes | Count | 252 | 158 | 410 |
| | | % within group | 93.3% | 94.0% | 93.6% |
| | No | Count | 18 | 10 | 28 |
| | | % within group | 6.7% | 6.0% | 6.4% |
| Total | | Count | 270 | 168 | 438 |
| | | % within group | 100% | 100% | 100% |
| Is oral sex considered a route of transmission? | Yes | Count | 201 | 105 | 306 |
| | | % within group | 74.4% | 62.5% | 69.9% |
| | No | Count | 69 | 63 | 132 |
| | | % within group | 25.6% | 37.5% | 30.1% |
| Total | | Count | 270 | 168 | 438 |
| | | % within group | 100% | 100% | 100% |
| Is kissing considered a route of transmission? | Yes | Count | 165 | 73 | 238 |
| | | % within group | 60.9% | 43.5% | 54.2% |
| | No | Count | 106 | 95 | 201 |
| | | % within group | 39.1% | 56.5% | 45.8% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Is shaking hands considered a route of transmission? | Yes | Count | 63 | 55 | 118 |
| | | % within group | 23.2% | 32.7% | 26.9% |
| | No | Count | 208 | 113 | 321 |
| | | % within group | 76.8% | 67.3% | 73.1% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Is shaving considered a route of transmission? | Yes | Count | 226 | 130 | 356 |
| | | % within group | 83.4% | 77.4% | 81.1% |
| | No | Count | 45 | 38 | 83 |
| | | % within group | 16.6% | 22.6% | 18.9% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Is sharing needles considered a route of transmission? | Yes | Count | 246 | 141 | 387 |
| | | % within group | 90.8% | 83.9% | 88.2% |
| | No | Count | 25 | 27 | 52 |
| | | % within group | 9.2% | 16.1% | 11.8% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Is pregnancy considered a route of transmission? | Yes | Count | 203 | 114 | 317 |
| | | % within group | 74.9% | 67.9% | 72.2% |
| | No | Count | 68 | 54 | 122 |
| | | % within group | 25.1% | 32.1% | 27.8% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Are mosquito bites considered a route of transmission? | Yes | Count | 137 | 82 | 219 |
| | | % within group | 50.6% | 48.8% | 49.9% |
| | No | Count | 134 | 86 | 220 |
| | | % within group | 49.4% | 51.2% | 50.1% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Is using public bathrooms considered a route of transmission? | Yes | Count | 144 | 55 | 199 |
| | | % within group | 53.1% | 32.7% | 45.3% |
| | No | Count | 127 | 113 | 240 |
| | | % within group | 46.9% | 67.3% | 54.7% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Is breast feeding considered a route of transmission? | Yes | Count | 134 | 58 | 192 |
| | | % within group | 49.6% | 34.5% | 43.8% |
| | No | Count | 136 | 110 | 246 |
| | | % within group | 50.4% | 65.5% | 56.2% |
| Total | | Count | 270 | 168 | 438 |
| | | % within group | 100% | 100% | 100% |

| | | | | | |
|--|-----|----------------|-------|-------|-------|
| Is sharing food with infected people considered a route of transmission? | Yes | Count | 89 | 37 | 126 |
| | | % within group | 32.8% | 22.0% | 28.7% |
| | No | Count | 182 | 131 | 313 |
| | | % within group | 67.2% | 78.0% | 71.3% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |

Table 1: Questions concerning routes of transmission of HIV.

| QUESTION | ANSWER | | SOUTH | NORTH | TOTAL |
|---|-----------|----------------|-------|-------|-------|
| Is AIDS considered a viral or bacterial infection? | Viral | Count | 209 | 136 | 345 |
| | | % within group | 77.1% | 81.0% | 78.6% |
| | Bacterial | Count | 62 | 32 | 94 |
| | | % within group | 22.9% | 19.0% | 21.4% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Are there any vaccines that prevent HIV infection? | Yes | Count | 147 | 69 | 216 |
| | | % within group | 54.2% | 41.1% | 49.2% |
| | No | Count | 124 | 99 | 223 |
| | | % within group | 45.8% | 58.9% | 50.8% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Is there a definitive treatment for HIV? | Yes | Count | 48 | 34 | 82 |
| | | % within group | 17.8% | 20.2% | 18.7% |
| | No | Count | 222 | 134 | 356 |
| | | % within group | 82.2% | 79.8% | 81.3% |
| Total | | Count | 270 | 168 | 438 |
| | | % within group | 100% | 100% | 100% |
| Are there any medications that prevent proliferation of the virus? | Yes | Count | 159 | 107 | 266 |
| | | % within group | 58.7% | 63.7% | 60.6% |
| | No | Count | 112 | 61 | 173 |
| | | % within group | 41.3% | 36.3% | 39.4% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Are there any medications that decrease the incidence of transmission from a pregnant woman to her fetus? | Yes | Count | 151 | 108 | 259 |
| | | % within group | 55.7% | 64.3% | 59.0% |
| | No | Count | 120 | 60 | 180 |
| | | % within group | 44.3% | 35.7% | 41.0% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Is AIDS common in Jeddah? | yes | Count | 126 | 90 | 216 |
| | | % within group | 46.5% | 53.6% | 49.2% |
| | no | Count | 145 | 78 | 223 |
| | | % within group | 53.5% | 46.4% | 50.8% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Are there any centers for free screening in Jeddah who will keep the results secret? | yes | Count | 202 | 89 | 291 |
| | | % within group | 74.5% | 53.0% | 66.3% |
| | no | Count | 69 | 79 | 148 |
| | | % within group | 25.5% | 47.0% | 33.7% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Is sexual contact the only way for transmission of the disease? | yes | Count | 106 | 60 | 166 |
| | | % within group | 39.1% | 35.7% | 37.8% |
| | no | Count | 165 | 108 | 273 |
| | | % within group | 60.9% | 64.3% | 62.2% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |

Table 2: General knowledge about HIV/AIDS.

| QUESTION | ANS. | | SOUTH | NORTH | TOTAL |
|--|------|----------------|-------|-------|-------|
| Are condoms considered a way to reduce incidence of the spread of the virus? | Yes | Count | 211 | 128 | 339 |
| | | % within group | 78.7% | 76.2% | 77.8% |
| | No | Count | 57 | 40 | 97 |
| | | % within group | 21.3% | 23.8% | 22.2% |
| Total | | Count | 268 | 168 | 436 |
| | | % within group | 100% | 100% | 100% |
| Is sterilization of shared needles considered a way to reduce incidence of the spread of the virus? | yes | Count | 226 | 136 | 362 |
| | | % within group | 83.4% | 81.4% | 82.6% |
| | no | Count | 45 | 31 | 76 |
| | | % within group | 16.6% | 18.6% | 17.4% |
| Total | | Count | 271 | 167 | 438 |
| | | % within group | 100% | 100% | 100% |
| Are routine checkups considered a way to reduce incidence of the virus? | yes | Count | 243 | 139 | 382 |
| | | % within group | 89.7% | 82.7% | 87.0% |
| | no | Count | 28 | 29 | 57 |
| | | % within group | 10.3% | 17.3% | 13.0% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Is isolation of infected people considered a way to reduce incidence of the spread of the virus? | yes | Count | 201 | 98 | 299 |
| | | % within group | 74.2% | 58.3% | 68.1% |
| | no | Count | 70 | 70 | 140 |
| | | % within group | 25.8% | 41.7% | 31.9% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Is avoiding eating with infected people considered a way to reduce incidence of the spread of the virus? | yes | Count | 158 | 91 | 249 |
| | | % within group | 58.3% | 54.2% | 56.7% |
| | no | Count | 113 | 77 | 190 |
| | | % within group | 41.7% | 45.8% | 43.3% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Is avoiding using public bathrooms considered a way to reduce incidence of the spread of the virus? | yes | Count | 178 | 89 | 267 |
| | | % within group | 65.7% | 53.0% | 60.8% |
| | no | Count | 93 | 79 | 172 |
| | | % within group | 34.3% | 47.0% | 39.2% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Is limiting sexual contact to within marriage considered a way to reduce incidence of the spread of the virus? | yes | Count | 200 | 107 | 307 |
| | | % within group | 73.8% | 63.7% | 69.9% |
| | no | Count | 71 | 61 | 132 |
| | | % within group | 26.2% | 36.3% | 30.1% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |

Table 3: Questions about preventative measures.

respondents did not have empathetic feelings towards patients, with no significant difference between the regions, while 34.3% of those in the south group and 45.8% in the north group felt contempt for infected people, and, overall, 60.4% thought HIV patients should be isolated.

Discussion

Evidence suggests that there are very poor surveillance systems for HIV/AIDS in Saudi Arabia and a lack of data on at-risk populations [14,15]. This is in common with many neighboring countries on the Arabian Peninsula and in the wider MENA region, which has the third fastest growing AIDS epidemic in the world [2]. The male:female ratio of 5:1 in HIV cases in KSA may indicate underreporting of female cases [14]; thus knowledge is particularly important for girls and women.

Meanwhile, there is stigma concerning HIV and AIDS in Saudi Arabia, which extends to the medical profession [10].

A number of cross-sectional studies undertaken among general populations (i.e., those without specialist medical training) in various countries have reported on knowledge about and attitudes to HIV/AIDS. For example, among workers in Japan [16]; students at a privately owned university in Nigeria [17]; undergraduates in Ghana [18]; secondary school students in Bangladesh [19] and China [20]; university students in Ethiopia [21]; and staff at a public university in Malaysia [22]. However, in general, data on HIV/AIDS from the MENA region is considered scarce [15,23]. A review of culture and HIV in the region concluded that there is a need for more academic engagement and political commitment [24].

| QUESTION | ANS. | | SOUTH | NORTH | TOTAL |
|---|------|----------------|-------|-------|-------|
| Do you feel shy asking a patient about the mode of their HIV infection? | yes | Count | 161 | 109 | 270 |
| | | % within group | 59.4% | 64.9% | 61.5% |
| | no | Count | 110 | 59 | 169 |
| | | % within group | 40.6% | 35.1% | 38.5% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Do you have empathetic feelings toward infected patients? | yes | Count | 213 | 125 | 338 |
| | | % within group | 78.6% | 74.4% | 77.0% |
| | no | Count | 58 | 43 | 101 |
| | | % within group | 21.4% | 25.6% | 23.0% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Do you have contempt for the infected person? | yes | Count | 93 | 77 | 170 |
| | | % within group | 34.3% | 45.8% | 38.7% |
| | no | Count | 178 | 91 | 269 |
| | | % within group | 65.7% | 54.2% | 61.3% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Do you think it is important to isolate the infected patient? | yes | Count | 168 | 97 | 265 |
| | | % within group | 62.0% | 57.7% | 60.4% |
| | no | Count | 103 | 71 | 174 |
| | | % within group | 38.0% | 42.3% | 39.6% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Do you think infected people must remain in their home? | yes | Count | 153 | 86 | 239 |
| | | % within group | 56.5% | 51.2% | 54.4% |
| | no | Count | 118 | 82 | 200 |
| | | % within group | 43.5% | 48.8% | 45.6% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |
| Do you think this research topic is important? | yes | Count | 252 | 142 | 394 |
| | | % within group | 93.0% | 84.5% | 89.7% |
| | no | Count | 19 | 26 | 45 |
| | | % within group | 7.0% | 15.5% | 10.3% |
| Total | | Count | 271 | 168 | 439 |
| | | % within group | 100% | 100% | 100% |

Table 4: Attitudes toward infected patients.

Decline in HIV in Thailand and Uganda was ascribed to education and support of young people [25]. Accurate knowledge is crucial to successfully protecting oneself against HIV, while lack of knowledge concerning transmission routes and fear of knowing one's HIV status lead to failure to get tested. Meanwhile, baseline studies of knowledge are important to highlight present deficiencies in awareness and to track the progress of any public health education or policy measures taken in the future. The present survey of high school students in the city of Jeddah highlights a number of areas of concern. For example, among those surveyed, 54% think kissing is a means of transmission, while 50% think mosquito bites are. Meanwhile, 49% think an HIV vaccine is available. Many (38%) answered that sexual contact is the only means of HIV transmission. There was significant uncertainty with respect to the relationships between pregnancy or breast feeding and HIV transmission to a child. These outcomes highlight a need for greater education in at least some aspects of HIV. However, some knowledge is clearly well established in the Jeddah students; for example, 93% and 88.2% of survey participants knew that sexual contact and sharing needles, respectively, are means of transmission, while 78% and 87% respectively knew that condom use and medical checkups are means

to reduce transmission. Nearly 90% considered that research into HIV/AIDS and attitudes towards it are important.

Our data also indicate substantial stigma associated with HIV/AIDS among the study group in Jeddah. Significant minorities think that shaking hands, sharing food and using public bathrooms are means of HIV transmission; 61% think avoiding using public bathrooms reduces the spread of the virus. Sixty percent think that isolating infected people is important; 39% feel contempt for infected people. Meanwhile, 49% think HIV/AIDS is common in Jeddah. Data are consistent with another study of Saudi teenagers [11], which reported, "some misconceptions about HIV transmission, intolerant attitude, stigma and discrimination toward HIV, which need to be addressed", and with studies of illegal residents of Saudi Arabia [10] and young people in Yemen [12]. In general, the better educated and more prosperous northern group in our study had slightly better awareness of HIV transmission routes and means of prevention than their southern counterparts, but also demonstrated higher stigma towards patients (in particular, contempt for an infected person, 45.8% vs. 34.3%).

Stigma and discrimination have been described as the most

important barriers to HIV treatment and prevention programs [16,26]. Fear of stigma has been shown to lead to a reduction in preventative behaviors (UNICEF, 2002). Studies, for example in Japan, have shown that knowledge neutralizes negative attitudes to HIV [16], while in China [20], educational intervention produced a significant increase in knowledge of and positive attitudes to HIV/AIDS. It has been shown that knowledge does not predict behavioral change where stigma is a factor, but knowledge is a prerequisite for change [27]. Again, our findings highlight the need for and desirability of formal education on HIV related topics in schools.

Schools are key players in HIV/AIDS education – both textbooks and teachers [19,22]. The mass media is also important; in Bangladesh, China and Turkey [20,19,28], watching TV was found to be the best predictor of knowledge about HIV. In a recent brief report on knowledge of adolescents in eastern Saudi Arabia, 39.2% reported that their major source of information on HIV was the media (11); in Iraq, the equivalent figure was around two-thirds [9]. The internet is a crucial resource in HIV/AIDS education (e.g. as found in Kenya and Brazil [18,20,29]). Such considerations are particularly relevant where information may not be available at home because of cultural conservatism (for example religious or traditional beliefs, strongly held in Saudi Arabia) and/or lack of knowledge [17,18].

Limitations of this Study

This was a cross-sectional study with all the inherent limitations that implies. The sample size was relatively small (n=438) and drawn from a narrow age group in a single city. The north sample group was concentrated in two schools. Jeddah may not be demographically representative of Saudi Arabia as a whole. It would be interesting to compare the results obtained here for young Saudi residents with the knowledge and opinions of older people to assess any generational shifts in awareness and attitude. Of note is that the north group contained fewer non-Saudi nationals (9.5%, n=15) than the south group (19.6%, n=53); given the considerably higher prevalence of HIV among non-Saudi nationals in Saudi Arabia than among nationals, this could have some influence on the results in this study.

Conclusion

This research provides data from a country (Saudi Arabia) and region (MENA) where recent data on attitudes to and knowledge of HIV/AIDS are sparse. The study provides a benchmark for future research and a basis for discussions of public policy towards HIV awareness and education in Saudi Arabia.

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