

# KNOWLEDGE OF MALE SECONDARY SCHOOL STUDENTS REGARDING PREVENTION OF ACUTE RESPIRATORY INFECTIONS IN ABHA CITY, KSA

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## ABSTRACT

**Background:** The most common infections among humans are the acute infections of the respiratory tract (ARTIs). The importance of ARIs in Saudi Arabia is relatively higher than anywhere else due to the annual Hajj pilgrimage season. There is a paucity of evidence in the literature about actual intervention strategies to improve respiratory infection control practices. Nevertheless, prevention has assumed a paramount importance in the fight against ARIs.

**Aims & Objective:** To assess the knowledge of male secondary school students regarding prevention of ARIs and its determinants.

**Material and Methods:** This is a cross-sectional study included male secondary school students studying at two randomly selected general governmental secondary schools in Abha City. Based on thorough literature review, the researcher has designed a self-administered Arabic questionnaire. It included the following: Personal characteristic of student as well as knowledge of students about prevention of ARIs including Measures to prevent respiratory infections, vaccination, importance of avoidance of sources of infection and early symptoms characterizing respiratory infections.

**Results:** The study included 1030 male secondary school students. Their age ranged between 15 and 22 years with a mean of  $17.12 \pm 1.06$ . Slightly less than half of the students (48.4%), recognized correctly the main causative agents for ARTIs while more than half of them (59.3%) recognized correctly the mode of transmission of ARTIs and the most susceptible victims for ARTIs (56.4%). Most of the students recognized correctly the different preventive measures of ARTIs (the percentage ranged between 84.9% for vaccination to 86.6% for proper hand washing several times daily). Students enrolled in the second or third grades, those whose mothers were university graduated, those having information from television or newspapers/magazines, those having a history of recent ARTI attack and being educated through physicians were less liable to have insufficient knowledge about ARTIs.

**Conclusion:** Saudi male students' knowledge about respiratory tract infections and about antibiotic therapy is often lacking. Improved health education may alter students' expectations concerning antibiotic therapy for their illness.

**KEY-WORDS:** URTI; Knowledge; Saudi Arabia; Adolescents

## Introduction

The most common infections among humans are the acute infections of the respiratory tract (ARIs). Their high tendency to recur makes them highly important for physicians at primary health care (PHC) practices.<sup>[1]</sup> The World Health Organization reported that ARIs constitute the most important cause for child mortality.<sup>[2]</sup> They are the leading cause of acute illnesses all over the world<sup>3</sup> and the first among causes of disability-adjusted life-years lost in developing countries.<sup>[3,4]</sup>

In KSA, ARIs are estimated to be responsible for 50% of morbidity in all children aged < 5 years attending the PHC centers.<sup>[5]</sup> However, the importance of ARIs in Saudi Arabia is relatively higher than anywhere else due to the annual Hajj pilgrimage season, where millions of Muslims from all over the world gather in Mecca at the same time. Such high density of crowding may present a risk for local, national and international outbreaks.<sup>[6]</sup>

The Saudi Ministry of Health (MOH) reported that the majority of outpatient visits to the PHC

centers are due to upper respiratory tract infection, with a higher predilection for males than females.<sup>[7]</sup>

ARIs spread by droplets that are generated when people sneeze, cough, laugh, or exhale. "Respiratory hygiene" is a term adopted by the Centers for Disease Control and Prevention (CDC) to describe measures that can be taken to limit the risk of spreading respiratory illnesses. These measures include, covering the mouth and nose with a tissue when coughing or sneezing; disposal of used tissues in a wastebasket; and frequently practicing hand hygiene (e.g., washing). Schools can minimize the risk of disease transmission by improving the student awareness of ARIs and practicing simple infection control measures.<sup>[8]</sup>

There is a paucity of evidence in the literature about actual intervention strategies to improve respiratory infection control practices. Nevertheless, prevention has assumed a paramount importance in the fight against ARIs. While there are costs associated with the implementation of any intervention, the benefits from the outcomes of such interventions have the potential to outweigh the cost.<sup>[9]</sup>

This study aimed at assessing the knowledge of male secondary school students regarding prevention of ARIs and its determinants.

## Materials and Methods

This study was a cross-sectional design conducted in Abha City, which is the capital of Aseer Region in Saudi Arabia. It is located more than 2,500 meters above sea level. This high altitude is frequently associated with various factors, such as immuno-modulation, hypoxia, which may predispose to infections.<sup>[10]</sup> It included male secondary school students studying at a general governmental secondary school in Abha City. A simple random sampling technique was adopted to select a number of schools to fulfill the minimum required sample size of students. The estimated minimum sample size for this study was decided according to Dahiru et al.<sup>[11]</sup>, it equals around 1070.

Based on thorough literature review, a questionnaire (in simple Arabic Language) has

been developed. It included the following: Personal characteristic of student including: age, scholastic year, type of study (general, literature, or science), nationality and parent's education. Knowledge of students about prevention of ARIs: measures to prevent respiratory infections, vaccination, importance of avoidance of sources of infection, early symptoms characterizing respiratory infections.

A pilot study was conducted on 50 secondary male students, whose data were not included into the main study. The objective of this pilot study was to test the data collection tool's wording as well as the clarity of stated questions. According to the results of the pilot study, some questions were modified, others were removed and some were added, in order to reach to the final form of the study questionnaire. The validity and reliability of the questionnaire have been proved.

All required official approvals, (including those from Aseer Directorate of Education and Learning, and those from the Joint Program of Family Medicine in Aseer) were obtained. Prior to data collection, students were fully informed about the objectives of the study. Each student has the right to accept or refuse participation in the study. Students were notified that they do not have to declare their names on the data collection sheet. The collected data were kept confidential and were used only for research purposes.

## Statistical Analysis

Collected data were verified and coded prior to computerized data entry. The researcher utilized the Statistical Package for Social Sciences (SPSS version 19.0) for data entry and analysis. Percentages mean and SD were used as descriptive statistics. Students' knowledge score regarding ARTIs was calculated as follow; the participated students were asked to answer questions about the main causative agents, mode of transmission, most susceptible victims, common symptoms, preventive measures and treatment of ARTIs. Right answer is giving the highest score. The overall score was calculated in the way that the higher the score, the higher the knowledge regarding ARTIs. The median value of the overall score was utilized as a cut-off point for

attitude categorization (it was 30 with a range of 9-40). Students were classified as having sufficient knowledge regarding ARTIs if they have overall score  $>30$  and as having unsatisfied attitude if they have a score  $\leq 30$ . Bivariate analyses of ARTIs knowledge score with regard to independent variables were done by crude odds ratios (Ors) and their 95% confidence intervals (95% CI). Variables that were significant in the bivariate analysis were included in the multivariate logistic regression analysis.

Acute respiratory tract infections knowledge score was treated as dependent variable in multivariate logistic regression analysis. The independent variables were: the demographic characteristics (scholastic year, type of education, school and maternal educational level), sources of information (television, newspapers/magazines and school books) and their recent history of ARTIs in the last month.

Multiple associations were evaluated in multiple logistic regression model based on the backward stepwise selection, where significant variables from the bivariate analysis were included. This procedure allowed the estimation of the strength of the association between each independent variable while taking into account the potential confounding effects of the other independent variables. The covariates were removed from the model if the likelihood ratio statistic based on the maximum likelihood estimates had a probability of  $> 0.10$ . Each category of the predictor variables was contrasted with the initial category (reference category). The adjusted measure of association between risk factors and knowledge was expressed as the odds ratio (OR) with 95% Confidence Interval (95% CI). Adjusted or crude ORs with 95% CI that did not include 1.0 were considered significant.

## Results

A total of 1030 male students completed the questionnaire, representing 96.3% of the total male students invited to participate in the study ( $n=1070$ ). Table 1 show that the age of the participants ranged between 15 and 22 years with a mean of  $17.12 \pm 1.06$ . The majority of them (87.8%) aged between 16 and 18 years. Saudi

students represented 85.8% of the participants. More than half of them (54.8%) were recruited from King Fahd secondary school while the remaining 45.2% were recruited from Saqr Quoreesh secondary school. Approximately one-third of them (31.6%) enrolled in the first year, 44.1 % and 24.3 in the second and third year respectively. More than one third of them (39.9%) were in the scientific branch while 31.4% and 28.7% were in the general and literature branches respectively. University educated fathers represented 24.4% of the participants while university graduated mothers represent 15% of them. Approximately 7.3% and 24.1% of fathers and mothers were illiterate respectively.

**Table-1: Demographic characteristics of the male secondary school students, Abha, Saudi Arabia**

| Socio-Demographic Variables |                        | No.<br>n=1030                     | %    |
|-----------------------------|------------------------|-----------------------------------|------|
| Age (years)                 | 15                     | 37                                | 3.6  |
|                             | 16                     | 256                               | 24.9 |
|                             | 17                     | 400                               | 38.7 |
|                             | 18                     | 249                               | 24.2 |
|                             | >18                    | 88                                | 8.6  |
|                             | Range<br>Mean $\pm$ SD | 15 – 22 years<br>17.12 $\pm$ 1.06 |      |
| Nationality                 | Saudi                  | 884                               | 85.8 |
|                             | Non-Saudi              | 146                               | 14.2 |
| Secondary School            | King Fahd              | 564                               | 54.8 |
|                             | Saqr quoreesh          | 466                               | 45.2 |
| Scholastic Year             | First                  | 326                               | 31.7 |
|                             | Second                 | 454                               | 44.1 |
|                             | Third                  | 250                               | 24.3 |
| Educational Type            | General                | 323                               | 31.4 |
|                             | Scientific             | 411                               | 39.9 |
|                             | Literature             | 296                               | 28.7 |
| Father Education            | Illiterate             | 75                                | 7.3  |
|                             | Primary                | 228                               | 22.1 |
|                             | Intermediate           | 203                               | 19.7 |
|                             | Secondary              | 273                               | 26.5 |
|                             | University             | 251                               | 24.4 |
| Mother Education            | Illiterate             | 248                               | 24.1 |
|                             | Primary                | 310                               | 30.0 |
|                             | Intermediate           | 134                               | 13.0 |
|                             | Secondary              | 184                               | 17.9 |
|                             | University             | 154                               | 15.0 |

### Participants' Knowledge about ARTI

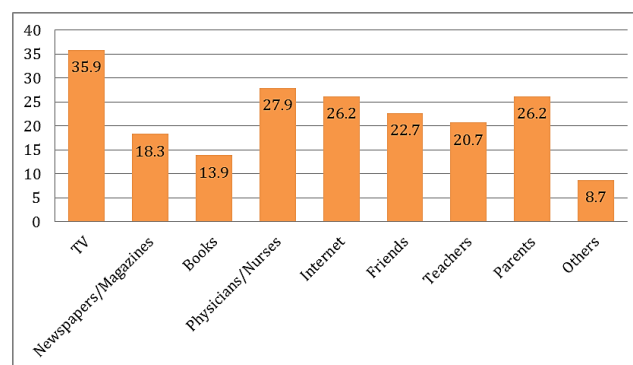
As shown in table 2, slightly less than half of the students (48.4%), recognized correctly the main causative agents for ARTIs while more than half of them (59.3%) recognized correctly the mode of transmission of ARTIs and the most susceptible victims for ARTIs (56.4%).

**Table-2: Participants' Knowledge of Acute Respiratory Tract Infections**

| Knowledge of ARTI  | Correct Answer N (%) |
|--|----------------------|
| The main causative agents for ARTIs  | 581 (56.4)           |
| The Mode of transmission for ARTIs   | 611 (59.3)           |
| The most susceptible persons for ARTIs                                       | 581 (56.4)           |
| URTI symptoms  |                      |
| • Fever  | 635 (61.7)           |
| • Cough  | 838 (81.4)           |
| • Sneezing   | 638 (61.9)           |
| • Difficulty of breathing  | 880 (85.4)           |
| • Running nose (rhinorrhoea)   | 610 (59.2)           |
| • Chest pain   | 794 (77.1)           |
| • Muscle pain (myalgia)  | 323 (31.4)           |
| • Joint pain (arthralgia)  | 309 (30.0)           |
| Bacteria causes most of ARTIs  | 150 (14.6)           |
| Most of ARTIs patients need treatment with antibiotics                       | 184 (17.9)           |
| Most of ARTIs patients cured in one week                                     | 241 (23.4)           |
| Decreasing use of antibiotics lower bronchopneumonia                         | 437 (42.4)           |
| Vitamin C plays an important role in ARTIs prevention                        | 384 (37.3)           |
| Among dangerous symptoms of ARTIs are chest pain and difficulty in breathing | 783 (76.0)           |
| The lung is the most affected part with ARTIS                                | 723 (70.2)           |
| URTI prevention  |                      |
| • Vaccination  | 874 (84.9)           |
| • Avoid contact with infected persons  | 883 (85.7)           |
| • Proper hand washing several times daily                                    | 892 (86.6)           |
| • Using of paper tissues and getting rid of them immediately                 | 886 (86.0)           |
| • Using face mask  | 889 (86.3)           |
| • Good aeration  | 880 (85.4)           |
| • Avoid crowding areas   | 877 (85.1)           |

Regarding symptomatology of ARTIs, difficulty of breathing and cough were the most correctly recognized symptoms of ARTIs (85.4% and 81.4% respectively). Chest pain, sneezing and fever were recognized as symptoms of ARTIs by 77.1%, 61.9% and 61.7% respectively, while running nose, myalgia and arthralgia were recognized as ARTIs symptoms by only 59.2%, 31.4% and 30% of students respectively. Most of the students recognized correctly the different preventive measures of ARTIs (the percentage ranged between 84.9% for vaccination to 86.6% for proper hand washing several times daily). More than half of the students (54.3%) answered that bacteria causes most of ARTIs and 58.1% answered that most of ARTIs patients need treatment with antibiotics. Only 23.4% of the students recognized that most of ARTIs patients

cured in one week and 37.3% recognized that vitamin C plays important role in ARTIs prevention. Most of the participants (76.0) recognized that chest pain and difficulty in breathing were amongst the dangerous symptoms of ARTIs. Most of the students answered that lung is the most affected part with ARTIs (70.2%) and 42.4% answered that decreasing the use of antibiotics will lower the occurrence of bronchopneumonia.



**Figure-1: Sources of Information regarding Acute Respiratory Tract Infections**

From figure 1, it is obvious that the source of information was television in 35.9% of the participants followed by physicians/nurses (27.9%), internet (26.2%) and parents (26.2%). Friends, teachers, newspapers/magazines and school books were the sources of information in 22.7%, 20.7%, 18.3% and 13.9% of the participants respectively.

**Determinants of ARTI Knowledge**

The results of bivariate analysis of determinants for having insufficient knowledge about ARTIs are summarized in Tables 3 to 5. Students aged over 18 years were more liable to be have insufficient knowledge (71.6%) compared with those aged 15 years (59.5%). However age was not independently associated with insufficient ARTIs knowledge.

Students enrolled in scientific branch were less liable to have insufficient knowledge about ARTIs than those enrolled in general branch (OR = 0.48; 95% CI: 0.35-0.65). Students enrolled in the second or third grades were less liable to have insufficient knowledge about ARTIs than those enrolled in first grade (OR = 0.66; 95% CI: 0.49-0.90, OR = 0.47; 95% CI: 0.33-0.67). Students of Saqr quoreesk secondary school were less liable



**Table-3: Demographic Determinants of ARTIs Insufficient Knowledge among Male Secondary School Students: Bivariate Analysis**

| Socio-Demographic Variables |                            | ARTIs Knowledge |                  | Crude OR** | 95% CI¶    |
|-----------------------------|----------------------------|-----------------|------------------|------------|------------|
|                             |                            | Sufficient (%)  | Insufficient (%) |            |            |
| Age (years)                 | 15 (37)                    | 15 (40.5)       | 22 (59.5)        | 1.00       |            |
|                             | 16 (256)                   | 91 (35.5)       | 165 (64.5)       | 1.24       | 0.58-2.63  |
|                             | 17 (400)                   | 207 (51.7)      | 193 (48.3)       | 0.64       | 0.30-1.32  |
|                             | 18 (249)                   | 112 (45.0)      | 137 (55.0)       | 0.83       | 0.39-1.77  |
|                             | >18 (88)                   | 25 (28.4)       | 63 (71.6)        | 1.72       | 0.71-4.14  |
| Nationality                 | Saudi (884)                | 389 (44.0)      | 495 (56.0)       | 1.00       |            |
|                             | Non-Saudi (146)            | 61 (41.8)       | 85 (58.2)        | 1.09       | 0.77-1.56  |
| Type of Education           | General (323)              | 114 (35.3)      | 209 (64.7)       | 1.00       |            |
|                             | Scientific (411)           | 219 (53.3)      | 192 (46.7)       | 0.48       | 0.35-0.65* |
|                             | Literary (296)             | 117 (39.5)      | 179 (60.5)       | 0.83       | 0.59-1.17  |
| School                      | King Fahd (564)            | 219 (38.8)      | 345 (61.2)       | 1.00       |            |
|                             | Saqr quoreesh (466)        | 231 (49.6)      | 235 (50.4)       | 0.65       | 0.50-0.83* |
| Scholastic Year             | First (326)                | 114 (35.0)      | 212 (65.0)       | 1.00       |            |
|                             | Second (454)               | 203 (44.7)      | 251 (55.3)       | 0.66       | 0.49-0.90* |
|                             | Third (250)                | 133 (53.2)      | 117(46.8)        | 0.47       | 0.33-0.67* |
| Father Education            | Illiterate (75)            | 32 (42.7)       | 43 (57.3)        | 1.00       |            |
|                             | Primary schools (228)      | 95 (41.7)       | 133 (58.3)       | 1.04       | 0.59-1.83  |
|                             | Intermediate schools (203) | 77 (37.9)       | 126 (62.1)       | 1.22       | 0.69-2.16  |
|                             | Secondary schools (273)    | 134 (49.1)      | 139 (50.9)       | 0.77       | 0.45-1.33  |
|                             | University (251)           | 112 (44.6)      | 139 (55.4)       | 0.92       | 0.53-1.61  |
| Mother Education            | Illiterate (248)           | 114 (46.0)      | 134 (54.0)       | 1.00       |            |
|                             | Primary schools (310)      | 94 (30.3)       | 216 (69.7)       | 1.95       | 1.36-2.81* |
|                             | Intermediate schools (134) | 62 (46.3)       | 72 (53.7)        | 0.99       | 0.63-1.54  |
|                             | Secondary schools (184)    | 90 (48.9)       | 94 (51.1)        | 0.89       | 0.60-1.33  |
|                             | University (154)           | 90 (58.4)       | 64 (41.6)        | 0.60       | 0.39-0.93* |

**Table-4: Source of Information as a Determinant of ARTIs Insufficient Knowledge among Male Secondary School Students: Bivariate Analysis**

| Source of Information    |           | ARTIs Knowledge           |                             | Crude OR** | 95% CI¶    |
|--------------------------|-----------|---------------------------|-----------------------------|------------|------------|
|                          |           | Sufficient (%)<br>(n=450) | Insufficient (%)<br>(n=580) |            |            |
| Television               | No (660)  | 268 (40.6)                | 392 (59.4)                  | 1.00       |            |
|                          | Yes (370) | 182 (49.2)                | 188 (50.8)                  | 0.71       | 0.55-0.91* |
| Newspapers/<br>Magazines | No (842)  | 354 (42.0)                | 488 (58.0)                  | 1.00       |            |
|                          | Yes (188) | 96 (51.1)                 | 92 (48.9)                   | 0.70       | 0.51-0.95* |
| School Book              | No (887)  | 399 (45.0)                | 488 (55.0)                  | 1.00       |            |
|                          | Yes (143) | 51 (35.7)                 | 92 (64.3)                   | 1.48       | 1.02-2.13* |
| Physicians/ Nurses       | No (743)  | 319 (42.9)                | 424 (57.1)                  | 1.00       |            |
|                          | Yes (287) | 131 (45.6)                | 156 (54.4)                  | 0.90       | 0.68-1.18  |
| Internet                 | No (760)  | 327 (43.0)                | 433 (57.0)                  | 1.00       |            |
|                          | Yes (270) | 123 (45.6)                | 147 (54.4)                  | 0.90       | 0.68-1.19  |
| Friends                  | No (796)  | 352 (44.2)                | 444 (55.8)                  | 1.00       |            |
|                          | Yes (234) | 98(41.9)                  | 136 (58.1)                  | 1.10       | 0.82-1.48  |
| Teachers                 | No (817)  | 360 (44.1)                | 457 (55.9)                  | 1.00       |            |
|                          | Yes (213) | 90 (42.3)                 | 123 (57.7)                  | 1.08       | 0.79-1.46  |
| Parents                  | No (760)  | 339 (44.6)                | 421 (55.4)                  | 1.00       |            |
|                          | Yes (270) | 111 (41.1)                | 159 (58.9)                  | 1.15       | 0.87-1.53  |
| Others                   | No (940)  | 409 (43.5)                | 531 (56.5)                  | 1.00       |            |
|                          | Yes (90)  | 41 (45.6)                 | 49 (54.4)                   | 0.92       | 0.60-1.42  |

**Table-5: Acute Respiratory Tract Infections' History and Insufficient Knowledge among Male Secondary School Students: Bivariate Analysis**

| Personal Habits                         |          | ARTIs Knowledge |                  | Crude OR** | 95% CI¶    |
|---|----------|-----------------|------------------|------------|------------|
|   |          | Sufficient (%)  | Insufficient (%) |            |            |
| History of ARTIs in the Last Month      | No (845) | 339 (40.1)      | 506 (59.9)       | 1.00       |            |
|   | Yes(185) | 111 (60.0)      | 74 (40.0)        | 0.45       | 0.32-0.62* |
| History of Physician's Health Education | No (90)  | 43 (47.8)       | 47 (52.2)        | 1.00       |            |
|   | Yes (94) | 66 (70.2)       | 28 (29.8)        | 0.39       | 0.20-0.74* |

\* Statistically significant; \*\* Odds ratio; ¶ Confidence interval

to have insufficient knowledge about ARTIs than those of King Fahd secondary school (OR = 0.65; 95% CI: 0.50–0.83). Students, whose mothers were university graduated, were less liable to have insufficient knowledge about ARTIs than those whose mothers were illiterate (OR = 0.60; 95% CI: 0.39–0.93). Out of expectation, students whose mothers were primary school graduated were more liable to have insufficient knowledge about ARTIs than those whose mothers were illiterate (OR = 1.95; 95% CI: 1.36–2.81) Student's nationality as well as fathers' educational level were not independently associated with having insufficient ARTIs knowledge as illustrated in table 3.

Among sources of information, results of bivariate analysis in table 4 showed that; having information from television or newspapers / magazines were significantly associated with less risk of having insufficient ARTIS knowledge (OR= 0.71; CI: 0.55-0.91, OR= 0.70; CI: 0.51-0.95 respectively). Out of expectation, having information from school books was significantly associated with more risk of having insufficient ARTIS knowledge (OR= 1.48; CI: 1.02-2.13). Having information from physicians/nurses, internet, friends, teachers, parents or other sources showed no significant association with ARTIs knowledge.

As displayed in table 5, having a history of recent ARTI attach and being educated through physicians were associated with less risk of having insufficient ARTIs knowledge (OR= 0.45; CI: 0.32-0.62, OR= 0.39; CI: 0.20-0.74 respectively).

In the multivariate analysis, Students enrolled in the second or third grades were less liable to have insufficient knowledge about ARTIs than those enrolled in first grade (OR = 0.47; 95% CI: 0.29–0.96, OR = 0.37; 95% CI: 0.26–0.91). Students whose mothers were university graduated were less liable to have insufficient knowledge about ARTIs than those whose mothers were illiterate (OR = 0.55; 95% CI: 0.37–0.96). Regarding sources of information, having information from television or newspapers/magazines were significantly associated with less risk of having insufficient ARTIS knowledge (OR= 0.41; CI: 0.22-0.78, OR= 0.47; CI: 0.29-0.81 respectively). Having a history of recent ARTI attach and being educated through

physicians were associated with less risk of having insufficient ARTIs knowledge (OR= 0.16; CI: 0.11-0.33, OR= 0.40; CI: 0.18-0.67 respectively). However, type of education, school and school books, as a source of information, were removed from the final logistic regression model. (Table 6)

**Table-6: Risk Factors for Depression: Results of Multivariate Logistic Regression Analyses**

| Variables                               |                            | Adjusted OR | 95% CI     |
|---|----------------------------|-------------|------------|
| School Year                             | First (326)                | 1.00        |            |
|   | Second (454)               | 0.47        | 0.29-0.96* |
|   | Third (250)                | 0.37        | 0.26-0.91* |
| Mother Education                        | Illiterate (248)           | 1.00        |            |
|   | Primary Schools (310)      | 1.25        | 0.82-1.65  |
|   | Intermediate Schools (134) | 1.47        | 0.91-1.82  |
|   | Secondary Schools (184)    | 1.51        | 0.92-2.02  |
| History of ARTIs in the Last Month      | University (154)           | 0.55        | 0.37-0.96* |
|   | No (845)                   | 1.00        |            |
| History of Physician's Health Education | Yes(185)                   | 0.16        | 0.11-0.33  |
|   | No (90)                    | 1.00        |            |
| Television                              | Yes (94)                   | 0.40        | 0.18-0.67* |
|   | No (660)                   | 1.00        |            |
| Newspapers/Magazines                    | Yes (370)                  | 0.41        | 0.22-0.78* |
|   | No (842)                   | 1.00        |            |
| Newspapers/Magazines                    | Yes (188)                  | 0.47        | 0.29-0.81* |
|   | No (842)                   | 1.00        |            |

\* P ≤ 0.05

## Discussion

As the prevalence of acute respiratory disease continues to increase globally, Saudi Arabia is no exception. Given the high disease prevalence, it is imperative that appropriate strategies must be devised to deal with these issues more effectively.

Surveyed students in the current study knew the following were symptoms of ARTI: fever (61.7% of the respondents), cough (81.4%), sneezing (61.9%), rhinitis (59.2%), myalgia (31.4%) and arthralgia (30%). Contrary to that, a study conducted among pilgrims from Marseille reported that surveyed pilgrims knew the following were symptoms of ARTI: cough (64.4% of the respondents), dyspnea (45.1), fatigue (33.3), expectoration (21%), fever (15.2%), rhinitis (8.7%) and sneezing (3.8%).<sup>[6]</sup> This difference between the two studies could be contributed to the difference in age and level of education between the participants in the two studies. In our study the mean age was around 17 years while in

the French study the mean age was 61 years as well the educational level was lower in the second study.

In the current survey, the majority of students (84.9%) recognized vaccination as a protective measure against ARTIs. In a study conducted among Hajj medical mission personnel, Saudi Arabia-2006,<sup>[12]</sup> influenza vaccination was associated with a 30% reduction in ARI compared to unvaccinated subjects, although this finding was not statistically significant. WHO has estimated the effectiveness of influenza vaccine in the reduction of disease-related morbidity to be 60%.<sup>[13]</sup>

In the present study, the majority of students (86.6%) recognized that frequent proper hand washing is a protective measure against ARTIs. In Al-Asmary et al study,<sup>[12]</sup> they noted a 5-fold greater risk of infection among those who never used alcohol-based hand disinfection compared to regular users. The use of alcohol-based hand rub as an effective infection control measure against ARI has been recommended by the World Health Association (WHO).<sup>[14]</sup> The World Muslim League has issued a fatwa allowing use of alcohol-based hand-rubs on skin as a disinfectant.<sup>[15]</sup>

As reported in the current study, most of the participants recognized using of face mask as a protective measure against ARTIs. According to another Saudi study,<sup>[12]</sup> the regular use of facemasks offered no significant protection against ARI. This finding is in agreement, however, with the conclusion of the Centers for Disease Control and Prevention (CDC) in the USA which stated that surgical masks are not designed for use as particulate respirators and do not provide much protection against airborne diseases because they do not effectively filter small particles from the air or prevent leakage around the edge of the mask when the user inhales.<sup>9</sup> Furthermore, they found that intermittent use of surgical-type masks was actually associated with more than a 2.5-fold greater risk of infection. It is possible that once a facemask is worn in the presence of an infected patient, the mask could become contaminated with infectious material and touching the outside of the device could result in hand transmission of the infection to the respiratory tract during nose-rubbing.<sup>[16]</sup> Recent studies demonstrated that

surgical and N95 masks were equally effective on preventing spread of influenza virus when used by infected patients. These masks also were potentially effective at preventing respiratory virus acquisition by household contacts of infected persons when worn by healthy persons. However effectiveness depended largely on adherence to mask use.<sup>[17,18]</sup>

The majority of the participants in the current study recognized that avoiding contact with infected persons is a protective measure against ARTIs. A study conducted among Hajj pilgrims from Marseille showed that 58.1% and 40.5% of the respondents believed that sneeze/cough products and contact with ill persons respectively were sources of contamination for ARTI. <sup>6</sup>Among a cohort of 274 French pilgrims participating in the 2009 Hajj, 77.4% used hand disinfectant, 89.8% used disposable handkerchiefs, and 79.6% used face masks; 97.4% were vaccinated against seasonal flu, 5.8% against H1N1, and 31.4% against pneumococcus. Influenza vaccine and face mask use did not significantly reduce respiratory symptoms.<sup>[19]</sup>

Public attitudes and expectations contribute to inappropriate antibiotic prescribing and antibiotic resistance. Widespread antibiotic use has fostered the emergence of antibiotic-resistant bacteria.<sup>[20]</sup> Patients' expectations have been cited as one reason for physicians to overprescribe antibiotics. More than half of the respondents in the current survey believed that most of ARTI patients need treatment with antibiotics. In another study, 17% of adults believed that antibiotics are never or almost never necessary for bronchitis. More than 70% believed that antibiotics are needed for green or yellow nasal drainage, and nearly half of respondents believed that they knew whether an antibiotic was needed before seeing a physician.<sup>[21]</sup> In a study conducted to investigate the parental knowledge about common respiratory tract infections and about antibiotic therapy in India.<sup>[21]</sup> Only 54% knew that a virus is the usual cause of the common cold, and 33% thought that a virus causes throat infection. Almost half (46%) believed that antibiotics kill viruses, while 17% were not sure whether antibiotics kill viruses. Most respondents (60%) had never heard about antibiotic resistance.

In the present survey, having information from television or newspapers/magazines was significantly associated with having sufficient ARTIs knowledge. The same has been reported in the study that assessed knowledge about health and nutrition among adults.<sup>[22]</sup>

Among limitations of the present study, it was difficult to include the female secondary school students in this study because of the conservative Saudi community. So, this study did not reflect the knowledge of female students regarding the prevention of ARTIs.

We can conclude that formal education is important in imparting health knowledge to adults, which in turn leads to important improvements in community health. In addition, as indicated in the multivariate analysis, the significance of watching television and reading newspapers as a source of information and maternal education makes us conclude that education is critical in enhancing adult's understanding and synthesis of information about health issues.

## Conclusion

Saudi male students' knowledge about respiratory tract infections and about antibiotic therapy is often lacking. Improved health education may alter students' expectations concerning antibiotic therapy for their illness.

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