Knowledge of tuberculosis among medical professionals and university students in Oman

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معارف أرباب المهن الطبية وطلاب الطب في عُمان حول السل

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الخلاصة: تعرَّفت هذه الدراسة التي أُجريت في عُمان على ما لدى 142 من طلاب الطب والمساعدين الطبيِّين و133 من طلبة العلوم غير الطبية (مثل طلبة الآداب والعلوم الاجتماعية) من معارف حول السل. وقُيِّمَت المعارف باستخدام استبيان موثوق الصحة يتضمَّن 28 عبارة تدور حول المعارف العامة، وعوامل الخطورة وتشخيص السل. وكما هو متوقَّع، كانت معارف طلاب الطب والمساعدين الطبيين أكثر وبشكل ملحوظ من معارف غيرهم، دون أن يكون هناك فرق بين الرجال والنساء. ورغم أن لدى طلاب الطب والمساعدين الطبيين معارف أكثر من غيرهم بشكل عام، فإن بعض العبارات التقنية قد حظيت بإجابات صحيحة لدى قسم كبير من طلبة العلوم غير الطبية.

ABSTRACT This study in Oman investigated knowledge about tuberculosis among 142 medics (medical students, paramedics) and 133 non-medics (arts and social science students). Knowledge was assessed using a validated questionnaire with 28 statements on general knowledge, risk factors and diagnosis of tuberculosis. As expected, tuberculosis knowledge was significantly higher among medics but there was no significant difference between men and women. Although medics had better knowledge in general, some of the technical statements were answered correctly by higher proportions of non-medics.

Connaissances concernant la tuberculose chez les professionnels médicaux et les étudiants universitaires à Oman

RÉSUMÉ La présente étude réalisée à Oman a examiné les connaissances concernant la tuberculose chez 142 étudiants en médecine et paramédicaux (les « médicaux ») et 133 étudiants de premier cycle en lettres et en sciences sociales (les « non-médicaux »). Les connaissances ont été évaluées au moyen d'un questionnaire validé comportant 28 affirmations relatives aux connaissances générales, aux facteurs de risque et au diagnostic de la tuberculose. Comme on pouvait s'y attendre, le niveau des connaissances concernant la tuberculose était significativement plus élevé chez les médicaux mais il n'y avait pas de différence significative entre les hommes et les femmes. Même si les médicaux avaient de meilleures connaissances en général, une réponse correcte a été fournie à certaines affirmations techniques par une plus grande proportion de non-médicaux.

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Received: 24/02/04; accepted: 14/02/05

Introduction

Globally, tuberculosis (TB) is regarded as one of the highest burden communicable diseases [*1*]. One-third of the world's population is already infected with the TB bacterium. By 2020 an estimated 200 million of these people would contract TB and there would be about 35 million deaths among them unless the infection rate is halted [*1*]. The situation is especially challenging in Asia, the Middle East and Africa [*2*] where there is a relatively high incidence of TB. As HIV-seropositivity tends to adversely amplify the severity of other immune-compromised conditions such as TB, the real incidence is likely to be even higher.

One essential step for adequate containment of TB is to ascertain the understanding in society of its risk factors, mode of transmission and diagnosis. It is becoming increasingly clear that many problems which were previously thought of as primarily biomedical are in fact more appropriately disentangled by changing individual and social attitudes and behaviour. TB- and HIV-related knowledge, attitudes, beliefs and practices have been examined in different parts of the world [*3,4*] and suggest the presence of a pervasive misunderstanding about the disease. TB is thought to be due to "idleness and generative tendency" and in some communities the word for TB is often associated with an insult [*4*]. TB has been thought to be hereditary, triggered by smoking, alcohol, even hard work, as well as exposure to cold [*4*]. Sufferers may hide their condition for fear of desertion, rejection or being blamed for spreading TB [*4*]. With the onset of the AIDS pandemic, the stigma of HIV has increased the existing stigma surrounding TB [*5*]. Such negative attitudes also persist among health care professionals. As TB control is essentially a management problem and health care professionals play a vital role, negative opinions among them are likely to have a wide-ranging influence, affecting the personal consequences of infection, prevention, care and management of the disease. Education may be one of the principal means for reducing or even halting the spread of TB.

As groundwork for embarking on such an undertaking, there is a need to establish the prevailing awareness towards TB. Despite a few anecdotal observations, attitudes towards TB have been little reported in the Arab world and to our knowledge, there has been no study on psychosocial issues associated with TB from Oman. Increasing affluence in the country has resulted in Omanis travelling to high-burden TB countries [*6*]. Oman also attracts a large labour force from parts of the world known to have epidemics of infectious diseases including TB [*7*]. The prevalence of TB in Oman has been classified as moderate with an annual risk of TB estimated to be around 1% [*8*]. The Ministry of Health in Oman has instituted the bacille Calmette–Guérin (BCG) vaccination programme to be universally dispensed to all infants at birth [*8*]. However, little is known about how TB is perceived by the Omani public.

The present study aimed to examine the knowledge about TB by medical professionals (medical students and paramedics) and by non-medical students. It was hypothesized that medics who have better health education were likely to have fewer misconceptions about the mode of transmission and other clinical aspects of TB than non-medics. We also postulated according to the "contact hypothesis" that previous exposure to TB would enhance a person's understanding and form a basis for heightening essential knowledge towards TB [*9*]. In a paternalistic society such as Oman, women have traditionally played a domestic role and it is not clear how such division of

roles would influence TB awareness. Studies carried out in different cultures suggest that there are gender differences in attitudes towards TB [*10*], and thus another aim of the present study was to examine whether knowledge differs between men and women in Oman.

Methods

Participants

The participants consisted of 2 groups operationalized for this study as "medics" and "non-medics". Medics were medical students and paramedics (nurses and technicians) working in a hospital setting. A random sample of 120 medical students were selected from the pool of medical students at the College of Medicine of Sultan Qaboos University: 105 completed the questionnaire. Out of a convenience sample of 50 nurses and technicians at the Sultan Qaboos University Teaching Hospital, 37 agreed to participate. The medical students were selected on the basis of their training in a subject that has an element of microbiology, and paramedics were those whose work involved contact with patients who were likely to carry some air borne diseases and therefore should have received some training in universal precautions procedures [*11*]. Non-medics were a convenience sample of 180 various arts and social science students at Sultan Qaboos University, of whom 133 participated.

Verbal consent was sought from each participant before a questionnaire was handed out. Most of the subjects filled the questionnaire within the vicinity of the clinics and laboratories at the Sultan Qaboos University Teaching Hospital. The participants were requested not to discuss the questionnaire with others. The students were also informed that their responses would have no influence on their grades or examination performance. The data were collected between April and May 2002.

Development of the questionnaire

The material for the questionnaire was adapted from the literature that reported on the understanding and attitudes toward infectious diseases [*3*]. The items of the questionnaire were specifically chosen for their established psychometric properties and their cross-cultural relevance and sensitivity. Literature searches resulted in a questionnaire that consisted of 28 different statements to elicit information on 3 broad areas; 14 items on general knowledge about TB, 5 on statements on risk factors and 9 statements on basic diagnosis of TB to which the respondents could respond "agree", "disagree" or "don't know". An initial sample of 60 health care professionals and 64 non-health care professionals (as defined above) were used for examining the factor structure and internal consistency and reliability of the assessment measure. The reliability (internal consistency and test–retest stability) has an alpha of 0.88 for the total scores. Only about 27% of the bivariate correlations were significantly different from zero at the 5% level; an indication of the lack of a relationship between the variables. Nine factors, out of a possible 28, explained only 60% of the variation. Hence all the variables were retained in the questionnaire.

Data analysis

The data was entered into the statistical software package *SPSS*. Cross-tabulations were computed from which odd ratios (OR) and their 95% confidence intervals (CI) were calculated. Tests of equal proportions were carried out using a large-sample test for proportions.

Results

Demographic data

A total of 275 students, technicians and nurses participated in the study: 43% male and 57% female. The medics comprised 105 medical students (45% pre-clinical and 55% clinical students) and 37 paramedics who were biomedical technicians and nurses. The non-medics were 133 students from the colleges of Arts and Social Science. The response rate was 78.6%. The overall mean age of respondents was 22.8 years (range 18–48 years): medics 23.7 years; non-medics 21.7 years; medical students 22.2 years and nurses and technicians 28.2 years. The non-medics were significantly older than the students.

Overall knowledge about TB

For all 28 questions about knowledge of TB, a significantly higher proportion of medics than non-medics gave the correct responses (71% versus 63%). A medic was 1.5 times more likely to give a correct response than a non-medic. There was no sex difference overall. The correct response rate among the student medics was significantly higher than for the technicians and nurses (72% overall versus 69%).

General knowledge about TB

There were 14 questions on general knowledge about TB. Overall, medics and non-medics gave 73% and 67% correct responses to the general statements (Table 1). The medics did better on 5 of the statements, the non-medics did better on 2 statements and there was no significant difference between the 2 groups for 7 statements. Almost all respondents believed that Oman is not free of TB; however, they believed the incidence to be low in the country. They knew that close contact with an infected person is harmful: 55% of medics and 38% of non-medics felt uncomfortable in the presence of a TB patient and 72% and 55% believed that keeping a TB patient at home carries a high risk of infecting others.

The proportion of males and females giving correct responses were not significantly different on 13/14 statements (Table 2). A higher proportion of males agreed that BCG vaccine does not provide 100% protection against TB and close contact with TB patients is harmful but this was not significant ($P = 0.06$). A higher proportion of females, agreed that simple hygienic precautions such as wearing masks and washing hands should be taken when taking care of TB patients but this was also not significant.

A comparison of medical students and paramedics in the medics group indicated that the 2 groups were similar on most of the general knowledge statements (Table 3). The students scored significantly higher on the statement "*Mycobacterium* could be dormant for many years and get reactivated" while the paramedics scored significantly higher for "incidence of TB in Oman is high".

Knowledge about risk factors or factors precipitating contracting TB

Various issues pertaining to risk factors for contracting TB were explored. Overall, medics knew the causes of TB 76% of the time as opposed to only 55% by the non-medics. Both medics and non-medics agreed that poor living conditions are a major contributing factor to the incidence of TB (Table 1). More medics (55%) correctly indicated that drinking raw infected milk could result in contracting TB than did non-medics (41%). High proportions of both groups agreed that TB is an airborne disease. Not surprisingly, a significantly higher proportion of medics (81%) than non-medics (46%) knew that TB is not caused by a virus. The odds of a medics knowing that TB is caused by a

Table1 Response rates for medics (medical students and paramedics) and non-medics (arts and social sciences students) on knowledge statements about tuberculosis (TB)

Variable	% correct response		P-value[a]	OR	(95% CI)
	Medics (n = 142)	Non-medics (n = 133)			
Knowledge factors					
An AIDS patient could be infected with the agent causing TB even if Mantoux test is negative	52	15	0.00	5.96	(3.34–10.64)
Two-weeks treatment with antibiotics ensures cure of TB	96	93	0.34	1.66	(0.57–4.80)
Mycobacterium could be dormant for many years and get reactivated	81	40	0.00	6.46	(3.73–11.17)
Protection against TB can be established by chemoprophylaxis	48	58	0.08	0.66	(0.41–1.06)
There are > 30 million deaths/year because of TB infection worldwide	60	79	0.00	0.40	(0.23–0.68)
All immigrants to Oman should be screened for Mycobacterium	81	77	0.43	1.27	(0.70–2.31)
Incidence of TB in Oman is high	79	87	0.10	0.58	(0.30–1.11)
Oman is a country which is free of TB	99	95	0.12	3.34	(0.66–16.83)
BCG vaccine ensures 100% protection against TB	87	92	0.17	0.57	(0.25–1.28)
Close contact with a patient having TB is harmless	89	83	0.20	1.56	(0.78–3.13)
Simple precautions like wearing mask, washing hands and good ventilation are helpful while taking care of a TB patient	83	72	0.03	1.92	(1.07–3.43)
I feel uncomfortable while talking to a patient with TB	55	38	0.00	2.02	(1.24–3.29)
A patient with TB must not share kitchen tools (plates, spoons, glasses, etc.) with others	36	50	0.02	0.56	(0.35–0.92)
Keeping a patient with TB at home carries the risk of infecting others	72	55	0.00	2.12	(1.28–3.52)
Risk factors					
TB is caused by a virus	81	46	0.00	4.96	(2.89–8.52)
Poor living conditions, crowdedness and refugee camps are good environments for transmission of TB	92	87	0.17	1.75	(0.79–3.88
HIV epidemic is the main reason behind the new outbreaks of TB worldwide	71	29	0.00	6.16	(3.65–10.39)
You can get TB by drinking raw milk from an infected animal	55	41	0.02	1.73	(1.07–2.79)
The commonest mode of transmission of TB is through inhalation of M. tuberculosis in aerosols and dust	81	71	0.05	1.77	(1.01–3.10)

Table1 Response rates for medics (medical students and paramedics) and non-medics (arts and social sciences students) on knowledge statements about tuberculosis (TB) (concluded)

Variable	% correct response Medics (n = 142)	Non-medics (n = 133)	P-value[a]	OR	(95% CI)
Diagnosis factors					
A 1-week dry cough is suggestive of TB	67	63	0.46	1.20	(0.73–1.98)
Every patient with TB coughs out bloody sputum	58	46	0.04	1.64	(1.02–2.65)
A person could be infected with TB but show no clinical symptoms throughout life	36	10	0.00	5.23	(2.68–10.20)
Disseminated TB does not involve meninges and bones	92	80	0.01	2.63	(1.27–5.46)
TB is only confined to the respiratory tract	91	73	0.00	3.68	(1.85–7.32)
TB is diagnosed using blood smears	59	61	0.79	0.94	(0.58–1.52)
Night fever and sweating are symptoms of patients with TB	67	46	0.00	2.44	(1.49–4.00)
A positive Mantoux test means a definite TB infection	89	89	0.99	1.01	(0.47–2.18)
A tuberculin test is essential to diagnose suspected cases of TB	39	88	0.00	0.09	(0.05–0.16)

OR = odds ratio, the odds of a medical person getting the correct answer versus a non-medical person.
[a]Two-sided P-value for testing equality of proportions.

bacterium was 5 times higher than non-medics.

In all statements except 2 there was no significant difference in the knowledge of the risk factors of TB between men and women (Table 2). Significantly more females knew that "poor living conditions, crowdedness and refugee camps were good environments for the transmission of TB" and "the commonest mode of transmission of TB is through inhalation of *M. tuberculosis* in aerosols and dust". The correct response was high for both sexes on these statements.

Both medical students and paramedics scored highly on most of the statements on the risk factors (Table 3). Medical students scored significantly higher only on 1 statement: "HIV is the main reason behind the new outbreaks of TB worldwide".

Knowledge about diagnosis of TB

Various issues regarding symptoms, signs and diagnosis of TB were compared between medics and non-medics. A direct comparison of the groups indicated that out of 9 questions, the proportion of respondents giving correct responses was similar on 3 questions. More of the medics knew the correct responses on 9 statements than the non-medics; however the differences were not significant (Table 1). On average 67% and 63% of the medics and non-medics knew some of the ways of diagnosing TB, and 92% of medics and 80% of non-medics knew that disseminated TB did not involve meninges and bones. Also 91% and 73% of medics and non-medics respectively knew that "TB is not confined only to the respiratory tract". Most of both groups (89%) agreed that a positive Mantoux

Table 2 Response rates for males and females on knowledge statements about tuberculosis (TB)

Variable	% correct response Males (n = 117)	Females (n = 152)	P-value[a]	OR	(95% CI)
Knowledge factors					
An AIDS patient could be infected with the agent causing TB even if Mantoux test is negative	33	35	0.72	0.91	(0.80–10.71)
Two-weeks treatment with antibiotics ensures cure of TB	97	93	0.09	2.92	(0.45–1.20)
Mycobacterium could be dormant for many years and get reactivated	57	64	0.22	0.73	(0.80–2.09
Protection against TB can be established by chemoprophylaxis	56	50	0.30	1.29	(0.57–1.61)
There are > 30 million deaths/year because of TB infection worldwide	69	70	0.86	0.95	(0.35–1.16)
All immigrants to Oman should be screened for Mycobacterium	75	83	0.13	0.63	(0.92–3.61)
Incidence of TB in Oman is high	88	80	0.08	1.82	(0.22–4.55)
Oman is a country which is free of TB	97	97	1.00	1.00	(1.01–6.00)
BCG vaccine ensures 100% protection against TB	94	86	0.04	2.46	(0.96–4.28)
Close contact with a patient having TB is harmless	91	82	0.06	2.03	(0.33–1.03)
Simple precautions like wearing mask, washing hands and good ventilation are helpful while taking care of a TB patient	72	82	0.06	0.58	(0.53–1.41)
I feel uncomfortable while talking to a patient with TB	45	48	0.56	0.87	(0.58–1.53)
A patient with TB must not share kitchen tools (plates, spoons, glasses, etc.) with others	41	43	0.81	0.94	(0.47–1.28)
Keeping a patient with TB at home carries the risk of infecting others	60	66	0.32	0.78	(1.28–3.52)
Risk factors					
TB is caused by a virus	62	66	0.50	0.84	(0.07–0.45)
Poor living conditions, crowdedness and refugee camps are good environments for transmission of TB	81	96	0.00	0.17	(0.45–1.17)
HIV epidemic is the main reason behind the new outbreaks of TB worldwide	46	54	0.19	0.73	(0.51–1.32)
You can get TB by drinking raw milk from an infected animal	45	50	0.42	0.82	(0.32–0.97)
The commonest mode of transmission of TB is through inhalation of M. tuberculosis in aerosols and dust	70	81	0.04	0.55	(0.82–2.27)

Table 2 Response rates for males and females on knowledge statements about tuberculosis (TB) (concluded)

Variable	% correct response Males (n = 117)	Females (n = 152)	P-value[a]	OR	(95% CI)
Diagnosis factors					
A 1-week dry cough is suggestive of TB	69	63	0.23	1.36	(0.80–2.09)
Every patient with TB coughs out bloody sputum	56	50	0.30	1.29	(0.49–1.54)
A person could be infected with TB but show no clinical symptoms throughout life	22	25	0.63	0.87	(0.68–2.79)
Disseminated TB does not involve meninges and bones	88	85	0.38	1.37	(0.74–2.65)
TB is only confined to the respiratory tract	85	80	0.30	1.40	(0.61–1.62)
TB is diagnosed using blood smears	59	60	0.97	0.99	(0.30–0.81)
Night fever and sweating are symptoms of patients with TB	47	64	0.00	0.49	(0.56–2.71)
A positive Mantoux test means a definite TB infection	90	88	0.61	1.23	(1.00–2.77)
A tuberculin test is essential to diagnose suspected cases of TB	69	57	0.06	1.67	(0.55–1.52)

OR = odds ratio, the odds of a male getting the correct answer versus a female.
[a]Two-sided P-value for testing equality of proportions.

test meant a definite TB infection. Significantly more of the non-medics (88%) than the medics (39%) knew that the tuberculin test is not essential to diagnose suspected cases of TB, whereas significantly more medics (67%) than non-medics (46%) knew that night fever and sweating are symptoms of TB. Very low proportions of medics (36%) and non-medics (10%) knew that a person could be infected with TB but show no clinical symptoms throughout life.

Overall, there were no significant differences between males and females as regards the diagnosis of TB; 65% of males and 64% of females knew the correct responses to the questions on diagnosis. Out of the 9 questions, there was only 1 question where the females significantly outperformed the males. Significantly more females correctly identified night fever and sweating as symptoms of TB. Very high proportions of both males and females knew that a positive Mantoux test did not mean a definite TB infection and also that TB was not confined only to the respiratory tract (Table 2).

The medical students scored significantly better than the paramedics on only 1 statement: that night fevers and sweating are symptoms of TB. Both medical students (40%) and paramedics (25%) scored poorly on the diagnosis statement "a person could be infected with TB but show no clinical symptoms throughout life" (Table 3). On all other statements there were no differences.

Discussion

Despite the triumph of "germ theory" and the enthusiasm for eradication in the past decade, infectious diseases continue to pose a global challenge. There have been no major recent advances in anti-TB drug development or research efforts that would translate into immediate meaningful reduc-

Table 3 Response rates for medics, comparing medical students and paramedics, on knowledge statements about tuberculosis (TB)

Variable	% correct response		P-value[a]	OR	(95% CI)
	Medical students (n = 105)	Paramedics (n = 37)			
Knowledge factors					
An AIDS patient could be infected with the agent causing TB even if Mantoux test is negative	56	41	0.11	1.85	(0.86–3.96)
Two-weeks treatment with antibiotics ensures cure of TB	94	100	0.14	0.00	–
Mycobacterium could be dormant for many years and get reactivated	87	65	0.00	3.48	(1.45–8.39)
Protection against TB can be established by chemoprophylaxis	43	59	0.09	0.52	(0.24–1.11)
There are > 30 million deaths/year because of TB infection worldwide	58	68	0.29	0.65	(0.30–1.44)
All immigrants to Oman should be screened for Mycobacterium	82	78	0.60	1.29	(0.51–3.27)
Incidence of TB in Oman is high	75	92	0.03	0.26	(0.07–0.93)
Oman is a country which is free of TB	99	97	0.44	2.86	(0.17–46.94)
BCG vaccine ensures 100% protection against TB	88	86	0.87	1.09	(0.36–3.31)
Close contact with a patient having TB is harmless	88	89	0.89	0.92	(0.28–3.05)
Simple precautions like wearing mask, washing hands and good ventilation are helpful while taking care of a TB patient	84	81	0.72	1.19	(0.45–3.16)
I feel uncomfortable while talking to a patient with TB	59	46	0.18	1.67	(0.78–3.55)
A patient with TB must not share kitchen tools (plates, spoons, glasses, etc.) with others	38	31	0.45	1.36	(0.60–3.07)
Keeping a patient with TB at home carries the risk of infecting others	75	64	0.20	1.70	(0.75–3.82)
Risk factors					
TB is caused by a virus	84	73	0.15	1.92	(0.79–4.68)
Poor living conditions, crowdedness and refugee camps are good environments for transmission of TB	91	94	0.56	0.63	(0.13–3.05)
HIV epidemic is the main reason behind the new outbreaks of TB worldwide	78	51	0.00	3.38	(1.53–7.47)
You can get TB by drinking raw milk from an infected animal	56	51	0.61	1.22	(0.57–2.58)
The commonest mode of transmission of TB is through inhalation of M. tuberculosis in aerosols and dust	82	78	0.64	1.25	(0.49–3.16)

Table 3 Response rates for medics, comparing medical students and paramedics, on knowledge statements about tuberculosis (TB) (concluded)

Variable	% correct response Medical students (n = 105)	Paramedics (n = 37)	P-value[a]	OR	(95% CI)
Diagnosis factors					
A 1-week dry cough is suggestive of TB	69	62	0.43	1.37	(0.63–3.00)
Every patient with TB coughs out bloody sputum	57	62	0.59	0.81	(0.38–1.75)
A person could be infected with TB but show no clinical symptoms throughout life	40	25	0.11	2.00	(0.86–4.68)
Disseminated TB does not involve meninges and bones	93	86	0.20	2.19	(0.65–7.37)
TB is only confined to the respiratory tract	90	92	0.80	0.84	(0.22–3.23)
TB is diagnosed using blood smears	57	64	0.49	0.76	(0.35–1.66)
Night fever and sweating are symptoms of patients with TB	72	54	0.04	2.20	(1.01–4.78)
A positive Mantoux test means a definite TB infection	88	91	0.62	0.72	(0.19–2.71)
A tuberculin test is essential to diagnose suspected cases of TB	37	43	0.50	0.77	(0.36–1.65)

OR = odds ratio, the odds of a medical student getting the correct answer versus a paramedic (nurse and technicians).
[a]Two-sided P-value for testing equality of proportions.

tion of transmission [*12,13*]. This means that other cost-effective ways to create a sustainable control of infectious diseases need to be considered to counter and control the rising tide of infectious diseases such as TB. As there is a pervasive lack of understanding of various aspects of TB among health practitioners [*12*], the International Union Against TB and Lung Disease and the World Health Organization have called for campaigns to increase awareness of TB [*14*], and many countries have made it mandatory for health sciences professionals to acquire training in universal precautions [*11*].

This study is the first of its type to be conducted in Oman. It was confined to students from the national university in Oman and it suggested that arts and social science students (operationalized as non-medics) do have an adequate knowledge of TB. Overall, 63% know the correct responses to the items on the questionnaire compared with 71% of those who are working as nurses, laboratory technicians or are medical students (operationalized as medics). If close proximity to an event leads to a better understanding of it [*9*], medics working with TB would be expected to have significantly better understanding than non-medics. The present study supports this idea, as medical professionals generally scored higher than non-medics on 20 out of 28 statements, although some of the differences were not significant.

Globally, TB kills more women than any single cause of maternal mortality [*15*]. As a result, campaigns to reduce the burden of TB have targeted women. In some parts of the world, women's movements are leading the efforts to control TB [*16*]. Little is known of the level of knowledge of TB among Omani women. This study compared men and women

and found, in general, that knowledge of TB was similar. Such a finding is not surprising since recent modernization has helped to equalize access to education in Oman. However, it is not clear whether this finding can be generalized to the rest of the country since the present sample consisted only of educated women attending university. More studies are needed to explore the effect of education and sex on awareness towards health-related matters.

The third aim of the present study was to assess whether awareness varies between medical students and their paramedical counterparts who are nurses and biomedical laboratory technicians. On the whole, medical students showed more accurate knowledge than paramedics. This is not surprising, as medical students were likely to have recently acquired knowledge about TB via their microbiology studies. It is possible that paramedics, being older, would have had their education when TB was viewed as a "conquered" illness.

Previous studies have generally demonstrated that both health care personnel and the general public do harbour negative attitudes toward people with TB and generally showed lack of knowledge [*17*]. Nonetheless, there are a few studies that have compared differences in the awareness of TB. At face value, the students appear to have a reasonable understanding of TB. On the other hand, the results of the present study are surprising because the gap in the knowledge of the 2 groups, "expert" and "non-expert", is very small.

It is important to consider the limitations of the present findings. It is possible that "ceiling" or "floor" effects might have resulted in the small difference between the 2 groups, medics and non-medics. However, assessment of the individual items did not suggest that questions were either too easy or too hard for the 2 groups. For example, it would be expected that only experts would know that a positive Mantoux test does not mean a presence of TB infection. However, a high proportion of the non-medics knew the correct response to statements that only experts would be expected to know. For example, a higher proportion of non-medics (88%) knew that the tuberculin test is not essential to diagnose suspected cases of TB as opposed to only 39% of the medics.

This study suggested that non-health-care professionals do have an adequate knowledge of TB. It is possible that this knowledge was obtained from the many readily available information sources on infectious diseases in Oman. However, the knowledge gap between medical and non-medical groups was low, which suggests that another possible limitation to the study is that the questionnaire did not discriminate between factual knowledge and correct guesses.

Another confounding factor of the present study is the heterogeneity of participants. The medics group comprised those working in a medical setting and included medical students and other paramedics. Such a diverse group might limit the ability to generalize the findings. However, there is a cultural rationale for the grouping, as in the Arab world the general public regards anybody working in the health sector as a "doctor", irrespective of his or her training. This study has operationalized various health professionals or prospective health practitioners as medics in view of the fact that these individuals are potential health care providers in the eyes of the community [*18*].

Similarly, the rationale for choosing a cohort of students needs to be justified. The Sultan Qaboos University, the only state university in the country, draws students from all regions and sub-cultural groupings in Oman. This group of young adults

reflects the population structure of Oman since 70% of the Omani population is aged under 20 years [*19*]. Epidemiological surveys from other parts of the world suggest that this age group is more conducive to health promotion campaigns and the young in a population are effective transmitters of health messages [*20*]. TB predominantly affects a similar age group. In addition, such a cohort constitutes a cadre of the new generation to have grown up during a 2-decade period of immense development in Oman.

Conclusion

If non-experts could be used as a reference for comparison, then this study lends support to the view that health care professionals in Oman have a good basic awareness of TB. However, item-by-item analysis suggests that the gap in the knowledge of TB is small between medic and non-medics. This would suggest that more awareness education is needed in Oman. Although the country has a moderate annual incidence rate of TB, health education is the first line of defence in an era of proliferating and treatment-resistant infectious diseases.

Acknowledgements

The data for this project was part of the baseline survey for the impact evaluation of health promotion initiatives for infectious disease, Sultan Qaboos University (Grant No. IG/MED/MICR/01/01; 20).

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