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Willingness to seek medical care for tuberculosis and associated factors among the elderly population in Shenzhen: a cross-sectional study

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ABSTRACT

Objectives This study was aimed to assess the willingness of elderly people to seek medical care for tuberculosis (TB) and the associated influencing factors.

Design A cross-sectional study.

Setting A multistage random survey was conducted in Bao'an District of Shenzhen in China.

Participants A total of 1200 elderly people aged 65 or above were recruited for the study and completed a structured questionnaire between September and October 2019.

Main outcome measures Descriptive and binary logistic stepwise regression analyses were conducted to analyse the characteristics of elderly individuals, their willingness to seek medical care for TB and associated factors.

Results Among the final 1123 respondents, 943 (84.0%) were willing to seek medical care if they discovered suspicious TB symptoms. Binary logistic stepwise regression analysis indicated that respondents whose family annual income per capita was 50 000–100 000¥ (OR=2.56, 95% CI: 1.44 to 4.54, p<0.01) and who had positive attitudes (≥3 scores: OR=3.10, 95% CI: 1.90 to 5.05, p<0.01) or practices (≥4 scores: OR=3.13, 95% CI: 1.82 to 5.39, p<0.01) towards TB were more willing to seek medical care for TB.

Conclusions Willingness to seek medical care for TB in the elderly population can be improved according to the determinants.

Strengths and limitations of this study

- This is the first study to investigate willingness to seek medical care for tuberculosis (TB) among elderly individuals in China.
- The logistic regression model provides quantified results of the influencing factors of willingness to seek medical care for TB among elderly individuals, which could provide a reference for TB control policies.
- There may be more potential influencing factors of willingness to seek medical care for TB than those we investigated in the study.
- The cross-sectional study design is limited in terms of identifying the causality of the observed relationships.

INTRODUCTION

Tuberculosis (TB) is a major cause of ill health, one of the top 10 causes of death worldwide, and the leading cause of death from a single infectious agent. In 2019, an estimated 10 million people worldwide fell ill with TB, and 1.4 million died.[1] The risk of TB increases with age, and the pace of population ageing is increasing in modern China. WHO has estimated that there will be 402 million people aged 60 or above in China by 2040.[2] The Fifth National TB Epidemiological Survey revealed that 48.8% of TB patients were over 60 years old, while the prevalence of active TB in the elderly population over 65 years old was determined to be 1270/100 000.[3] According to the Chinese Centre for Disease Control and Prevention, a total of 775 764 cases of TB were reported in the National Notifiable Disease Reporting System in 2019.[4] The reporting rate of TB cases increased with age, with 197 730 (25.5%) cases among people aged 65 or older.[4] Elderly people are one of the bottlenecks in TB control in China, and more TB preventive measures are urgently needed to reach the most vulnerable populations.

Currently, the 'trinity' model of TB prevention and treatment in China comprises the Centre for Disease Control and Prevention, designated TB diagnostic and treatment hospitals and primary healthcare institutions.[5] This model plays an important role in TB control and has made some progress. However, the rate of delay in TB diagnosis and treatment has remained high among the elderly,[6–8] which is a major contributor to poor outcomes and TB transmission. The willingness to seek medical care of elderly

people with possible symptoms could predict the actual behaviour of seeking care in TB prevention and treatment institutions. In addition, positive behaviour related to TB could both improve the detection rate for the disease and also reduce the proportion of delayed diagnosis and treatment.[9] Therefore, this study aimed to examine willingness to seek medical care for TB and its determinants among elderly people aged 65 or older. The findings may provide references for TB prevention and control among the elderly.

METHODS

Study setting

Shenzhen, a highly developed region in China, had an estimated population of more than 13.4 million in 2019.[10] The percentage of the migrant population was 63.2% in Shenzhen compared with 80.5% in Bao'an District.[10] The immigrants were mostly poor, had a low level of education and lived in circumstances conducive to TB transmission.[11 12] Although the incidence of TB has declined in Shenzhen, the prevalence of TB has remained high in Bao'an District due to a high TB case load caused by a heavy concentration of migrants.

The Chinese government launched the directly observed treatment +short (DOTS) course chemotherapy strategy to control the TB epidemic in 1990 and has followed this protocol since then.[13] Shenzhen was one of the first cities in China to implement the DOTS strategy in 1993, and its coverage at the individual level reached 100% in 2000.[14] Economy and social progress developed rapidly in Shenzhen, which was the first established special economic zone in China. The region has a robust healthcare infrastructure, providers, service culture and conditions for timely diagnosis and treatment.[9 12] The Centre for Chronic Disease Control, the local institution designated for TB management, provides TB diagnosis, treatment and management. Patients have free access to anti-TB fix-dose combination products and must undergo standard anti-TB treatment.[15] After patients start to take anti-TB drugs, they are required to visit the Centre for Chronic Disease Control every month for health checks until the treatment ends.[11] In addition to free TB drugs, the government provides subsidies for transportation and nutrition for low-income TB patients.[16] However, all patients must pay for monthly prescriptions for subsidiary drugs such as liver protection drugs, and auxiliary examinations, such as X-ray tests.[11 17]

Study population and sampling

This study was conducted between September and October 2019 in Bao'an District of Shenzhen. With a confidence interval (CI) of 95%, an estimated proportion of 92.2%[18] and an absolute error of 5%, the sample size was rounded to 113 according to the formula, $n = [Z^2p(1-p)]/d^2$. To compensate for non-responses, the sample size was increased by 10% to 124.

A multistage random sampling method was performed in the study. First, two of eight community health service centres with chest X-ray film screening capabilities in Bao'an District were selected randomly. Second, 600 people aged 65 or above who received health examinations were randomly selected from every community health service centre. Elderly people in the study communities were included in the survey if they: (1) were aged 65 or older, (2) had resided in the area for at least half a year, (3) had no communication disorders or mental illnesses and (4) were willing to complete the survey. Respondents were excluded if they did not meet any of the above requirements.

Patient and public involvement

No patients were involved in this study.

Study design and instrument

A cross-sectional study was used to collect data from the elderly population through face-to-face interviews with a structured questionnaire. Based on the actual conditions of elderly people in Shenzhen and the context of healthcare in China, we designed a questionnaire according to previous literature.[18–21] The questionnaire contained four sections: (1) demographic characteristics, such as gender, age, residence, duration of residence in Shenzhen, education level, marital status, medical insurance and family annual income per capita; (2) health-related characteristics, including self-perceived health status, smoking and alcohol consumption habits and previous history of TB; (3) knowledge, attitudes and practices (KAP) for TB prevention and control;[22] and (4) willingness to seek medical care for TB and specific reasons for being unwilling to seek medical care for TB (online supplemental appendix). In the TB KAP section, incorrect, inappropriate or uncertain (do not know) responses received a 0 score, while 1 point was assigned if the respondent chose the correct or appropriate answer; correctness or appropriateness was based on current literature and best practices. The respondents who answered 60% of the KAP questions correctly or appropriately were considered aware of TB or to have positive attitudes or practices regarding TB.

Data collection and quality control

The questionnaire was designed based on literature review, group discussions and mock interviews. A pilot study of 40 elderly people was conducted at one of the community health service centres in the Bao'an District of Shenzhen to improve the quality of the questionnaire. A total of 38 of those respondents were able to clearly understand all the questions of the questionnaire, and further modifications were made according to their feedback. The questionnaire had good validity among elderly people. The data were collected by trained investigators through a field questionnaire survey. A logic check of all data was undertaken to determine whether there were any contradictions. Logical errors were identified

as certain mismatched sociodemographic characteristics; for example, an individual aged 70 years old reported a duration of residence in Shenzhen of more than 70 years.

Statistical analysis

All statistical procedures were performed using SPSS V.22.0 software. The descriptive statistics are presented as the number of observations in percentages (%). χ^2 tests were conducted to compare the willingness of the elderly to seek medical care for TB between groups. A binary stepwise logistic regression model was used to analyse the factors associated with willingness to seek medical care for TB among the elderly (levels for selection and elimination p=0.05 and p=0.10, respectively), including a neutral attitude or unwillingness as the reference category. In the binary model, independent variables were age (65–70, 71–75, >75), gender (male, female), residence (local residents, others), education (primary school or below, junior or senior middle school, college degree or above), marital status (married, unmarried/widowed/divorced), medical insurance (yes, no), family annual income per capita (<50 000¥, 50 000–100 000¥, 100 000–200 000¥, >200 000¥), self-perceived health status (good, fair, bad), smoking status (current smoker, former smoker, never smoked), alcohol intake (current drinker, former drinker, never drank), TB knowledge scores (<3, ≥3), TB attitudes (<3, ≥3) and TB practices (<4, ≥4). The odds ratio (OR) and 95% CI for each variable were calculated. All tests were two-sided with a significance level of 0.05.

RESULTS

Initially, 1200 elderly people were recruited for the survey, of whom 11 (0.92%) refused to participate. Based on the inclusion and exclusion criteria, 1172 participants were ultimately included in the analyses. Because a previous history of TB might have influenced willingness to seek medical care for TB, we further excluded 35 participants who had previously been treated for TB. Then, we deleted eight questionnaires due to missing data on willingness to seek medical care for TB. Additionally, we discarded six questionnaires with logical errors. Finally, 1123 eligible questionnaires remained for analysis.

The characteristics of the participants are reported in table 1. Among 1123 participants (response rate, 94.45%), 505 (45.3%) were males and 584 (52.5%) were aged 65–70 years. More than half (55.4%) had an educational level of primary school or below. The majority (78.8%) held non-Shenzhen household registrations, and 947 (89.0%) were married. Most (73.3%) of the participants had medical insurance. Of the respondents, 398 (37.8%) had a family annual income per capita lower than 50 000¥. Less than half (48.1%) reported having a good self-perceived health status. Only 119 (10.7%) and 106 (9.5%) were current cigarette smokers and alcohol drinkers, respectively. The knowledge awareness rate for TB among them was 69.1%. The

Table 1 Characteristics of the study population*

Variables	N	%
Total	1123	100
Age, years		
65–70	584	52.5
71–75	312	28.0
>75	217	19.5
Gender		
Male	505	45.3
Female	611	54.7
Residence		
Local residents	232	21.2
Others	862	78.8
Education level		
Primary school or below	605	55.4
Junior or senior middle school	423	38.7
College degree or above	64	5.9
Marital status		
Married	947	89.0
Unmarried/widow/divorced	117	11.0
Medical insurance		
Yes	779	73.3
No	284	26.7
Family annual income per capita (¥)		
<50 000	398	37.8
50 000–100 000	342	32.4
100 000–200 000	221	21.0
>200 000	93	8.8
Self-perceived health status		
Good	505	48.1
Fair	476	45.3
Bad	69	6.6
Smoking status		
Current smoker	119	10.7
Former smoker	92	8.3
Never smoker	902	81.0
Alcohol intake		
Current drinker	106	9.5
Former drinker	82	7.3
Never drinker	931	83.2
TB knowledge scores		
<3	333	30.9
≥3	746	69.1
TB attitudes scores		
<3	546	52.0
≥3	505	48.0
TB practice scores		

Continued

Table 1 Continued

Variables	N	%
<4	555	57.8
≥4	406	42.2

*Missing number of participants: age: 10; gender: 7; residence: 29; education level: 31; marital status: 59; medical insurance: 60; family annual income per capita: 69; self-perceived health status: 73; smoking status: 10; alcohol consumption habits: 4; TB knowledge scores: 44; TB attitudes scores: 72; TB practice scores: 162.
TB, tuberculosis.

percentages of respondents who had positive attitudes or practices were 48.0% and 42.2%, respectively.

A total of 943 (84.0%) respondents would choose to seek medical care if they exhibited possible TB symptoms, whereas 155 (13.8%) were unwilling to seek treatment. Additionally, when we investigated the reasons for unwillingness to seek medical care for TB, 82 (52.9%) reported 'long treatment cycle and heavy financial burden' as the main reason (table 2).

Table 3 demonstrates the results of a comparison of willingness to seek medical care for TB among various groups. There were significant differences in willingness to seek medical care for TB across scores for TB KAP ($p<0.05$). There were no significant differences in willingness to seek medical care for TB across genders, ages, residences, education levels, marital statuses, medical insurance statuses, family annual income per capita levels, self-perceived health statuses, tobacco use, or alcohol consumption ($p>0.05$).

Table 4 shows the results of the binary logistic regression analysis to determine factors associated with willingness to seek medical care for TB among the elderly. Family annual income per capita (50 000–100 000¥: OR=2.56, 95% CI: 1.44 to 4.54), attitudes towards TB (≥3: OR=3.10, 95% CI: 1.90 to 5.05) and practices towards TB (≥4: OR=3.13, 95% CI: 1.82 to 5.39) were significant predictors of the respondents' willingness to seek medical care for TB.

DISCUSSION

This was the first study to investigate the willingness of elderly individuals to seek medical care for TB in China. We found that 84.0% of the participants were willing to seek medical care for TB, while 13.8% were unwilling to seek medical care for TB. Individuals with possible TB symptoms who do not seek medical care will miss the opportunity for early detection of TB, leading to delayed treatment and poor prognoses.[23–25] In addition, unwillingness to seek medical care may increase the potential risk of transmission and will have a negative impact on their families and society.[26]

Our findings showed that the main reason for being unwilling to seek medical care for TB was 'long treatment cycle and heavy economic burden'. This indicated that individuals' economic situation impacts their willingness to seek treatment. In China, the policy that TB diagnosis and anti-TB drugs are free is not well understood, and some even doubt its authenticity.[27 28] In addition, the free items provided by the government accounted for less than 40% of the total cost of TB diagnosis and treatment, meaning that TB patients still must pay more than half of the total cost.[29] This may explain the effects of economic situation on willingness to seek medical care for TB. Similarly, the economic burden has been found to be a key factor hindering health-seeking behaviours among TB patients, as well as a primary concern for TB control in India,[23] Indonesia,[30] Malawi,[31] the Middle East and North Africa.[32] To reduce the economic burden on TB patients, it is important for the government to expand health insurance coverage and lower the costs of TB treatment. The economic factor was further supported by the multivariate analysis result that family annual income per capita affected the willingness of the elderly to seek treatment. However, the significant association between family annual income per capita and willingness to seek medical care appeared only in the respondents who had 50 000–100 000¥ of family annual income per capita. The percentage of respondents whose family annual income per capita was more than 100 000¥ was relatively low in our study. Income is a sensitive topic and elderly people may under-report it. Thus, the effects of high family annual income per capita on willingness to seek medical care may have been underestimated in this study.

Many participants worried about being discriminated against for visiting TB prevention and treatment institutions, which was another important factor hindering their willingness to seek treatment. This was consistent with previous findings in South Africa,[33] Ethiopia,[34]

Table 2 Distribution according to the reasons of unwillingness to seek medical care for TB among elderly population (n=155)

Items	N	%
Lack of trust in the medical level of TB prevention and treatment institutions	40	25.8
Poor attitude of medical staff	8	5.2
Long treatment time and heavy economic burden	82	52.9
Fear of discrimination	46	29.7
Others	55	35.5

TB, tuberculosis.

Table 3 Factors associated with medical care-seeking willingness for tuberculosis among elderly population* (n=1123)

Variables	Willing	Neutral	Unwilling	χ^2	P value
Total	943 (84.0)	25 (2.2)	155 (13.8)		
Age, years					
65–70	490 (52.4)	12 (48.0)	82 (53.9)	1.74	0.78
71–75	262 (28.0)	6 (24.0)	44 (28.9)		
>75	184 (19.7)	7 (28.0)	26 (17.1)		
Gender					
Male	430 (45.9)	12 (48.0)	63 (40.6)	1.58	0.45
Female	506 (54.1)	13 (52.0)	92 (59.4)		
Residence					
Local residents	185 (20.2)	9 (36.0)	38 (24.8)	5.04	0.08
Others	731 (79.8)	16 (64.0)	115 (75.2)		
Education level					
Primary school or below	503 (54.9)	13 (54.2)	89 (58.9)	3.23	0.52
Junior or senior middle school	363 (39.6)	10 (41.7)	50 (33.1)		
College degree or above	51 (5.6)	1 (4.2)	12 (7.9)		
Marital status					
Married	795 (89.1)	22 (91.7)	130 (87.8)	0.39	0.82
Unmarried/widow/divorced	97 (10.9)	2 (8.3)	18 (12.2)		
Medical insurance					
Yes	657 (73.7)	19 (79.2)	103 (69.6)	1.55	0.46
No	234 (26.3)	5 (20.8)	45 (30.4)		
Family annual income per capita (¥)					
<50 000	337 (38.0)	9 (39.1)	52 (36.1)	9.39	0.15
50 000–100 000	300 (33.8)	5 (21.7)	37 (25.7)		
100 000–200 000	173 (19.5)	7 (30.4)	41 (28.5)		
>200 000	77 (8.7)	2 (8.7)	14 (9.7)		
Self-perceived health status					
Good	420 (47.8)	11 (50.0)	74 (49.7)	1.16	0.89
Fair	403 (45.8)	10 (45.5)	63 (42.3)		
Bad	56 (6.4)	1 (4.5)	12 (8.1)		
Smoking status					
Current smoker	105 (11.3)	3 (12.0)	11 (7.1)	4.73	0.32
Former smoker	78 (8.4)	0 (0.0)	14 (9.0)		
Never smoker	750 (80.4)	22 (88.0)	130 (83.9)		
Alcohol intake					
Current drinker	91 (9.7)	4 (16.0)	11 (7.1)	2.39	0.67
Former drinker	68 (7.2)	2 (8.0)	12 (7.7)		
Never drinker	780 (83.1)	19 (76.0)	132 (85.2)		
TB knowledge scores					
<3	249 (27.5)	12 (50.0)	72 (48.3)	30.25	<0.01
≥3	657 (72.5)	12 (50.0)	77 (51.7)		
TB attitudes scores					
<3	417 (47.3)	15 (65.2)	114 (77.6)	47.74	<0.01
≥3	464 (52.7)	8 (34.8)	33 (22.4)		

Continued

Table 3 Continued

Variables	Willing	Neutral	Unwilling	χ^2	P value
TB practice scores					
<4	433 (53.6)	18 (85.7)	104 (78.8)	36.41	<0.01
≥4	375 (46.4)	3 (14.3)	28 (21.2)		

*Missing number of participants: age: 10; gender: 7; residence: 29; education level: 31; marital status: 59; medical insurance: 60; family annual income per capita: 69; self-perceived health status: 73; smoking status: 10; alcohol consumption habits: 4; TB knowledge scores: 44; TB attitudes scores: 72; TB practice scores: 162.
TB, tuberculosis.

India, Bangladesh, Malawi and Columbia.[35] Previous studies have shown that TB patients suffer from widespread discriminatory and differential treatment due to long-term stereotypes about TB.[33 36] The fear of being discriminated against can affect elderly people' willingness to seek medical care, health-seeking behaviours and compliance during the treatment process.[9 33 37] In addition, evidence has shown that TB stigma was associated with patient delay and diagnostic delay.[9] Available evidence suggests that measures aimed at empowering TB patients to resist stigmatising perceptions, as well as efforts to change norms related to TB, can be effective in reducing the stigma associated with TB.[38] To increase the willingness of the elderly population to seek medical care and enable them to receive timely treatment, it is crucial to further popularise knowledge about TB and eliminate the denigration and stigmatisation of TB through a variety of effective educational methods.

The results of the multivariate analysis showed that higher scores on attitudes and behaviours related to TB prevention and control were associated with greater willingness to seek medical care for TB. However, the prevalence of positive attitudes and practices towards TB was low. Therefore, measures should be taken to improve TB-related attitudes and behaviours among the elderly, which may help to increase willingness to seek medical care for TB. Intriguingly, we found that TB knowledge scores were not a significant determinant of willingness to seek medical care in the multivariate analysis, which was not in line with previous studies.[9 25 26 32 39] Therefore, the association between TB knowledge and willingness to seek medical care needs further research.

This study had several strengths. First, it was the first to investigate the willingness of the elderly to seek medical care for TB in China. Second, our research found that certain important factors were associated with willingness to seek medical care, which could provide a reference for TB control policies among elderly people. However, some limitations should be noted. First, there may be more potential influencing factors of willingness to seek medical care than those we investigated in the study. Second, we listed 'others' as an open-ended response to reasons for unwillingness to seek medical care for TB but failed to acquire information about the specific other reasons, as the respondents did not provide detailed answers to this question. In future research, we could consider designing specific responses to investigate elderly people's additional reasons for being unwilling to seek medical care for TB. Third, the study was cross-sectional, and thus was limited in terms of identifying the causality of the

Table 4 Binary logistic regression analysis for the association with medical care-seeking willingness for tuberculosis among elderly population* (n=903)

Variables	B	SE	Wald χ^2	P value	OR (95% CI)
Family annual income per capita (¥) (ref:<50 000)					
50 000–100 000	0.94	0.29	10.37	<0.01	2.56 (1.44 to 4.54)
100 000–200 000	−0.10	0.26	0.15	0.69	0.90 (0.54 to 1.51)
>200 000	0.29	0.39	0.57	0.45	1.34 (0.63 to 2.86)
TB attitudes scores (ref: <3)					
≥3	1.13	0.25	20.51	<0.01	3.10 (1.90 to 5.05)
TB practice scores (ref: <4)					
≥4	1.14	0.28	16.93	<0.01	3.13 (1.82 to 5.39)

*Adjustment for age (65–70, 71–75, >75), gender (male, female), residence (local residents, others), education (primary school or below, junior or senior middle school, college degree or above), marital status (married, unmarried/widow/divorced), medical insurance (yes, no), self-perceived health status (good, fair, bad), smoking status (current smoker, former smoker, never smoker), alcohol intake (current drinker, former drinker, never drinker), TB knowledge scores (<3, ≥3) and other variables in the model.
OR, odds ratio; SE, standard error; TB, tuberculosis.

observed relationships. Fourth, this study enrolled only elderly people in Shenzhen, limiting the generalisability of the findings to other geographical regions.

CONCLUSION

In summary, this study found that family annual income per capita and TB-related attitudes and practices were significant predictors of willingness to seek medical care for TB among the elderly population. It is necessary to publicise TB-related knowledge and policies among the elderly. Measures must be taken to reduce the economic burden, clarify social misconceptions about TB and eliminate discrimination against TB patients.

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