

# Preventive Strategies for Tuberculosis among New Student Entrants and Potential Impacts of Prevention

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**Abstract: Objective:** To analyze the tuberculosis prevention strategies for new students entering school and their potential impacts on prevention. **Methods:** A study was conducted on 500 new students from a high school in our district from September 2022 to June 2023. Routine management was implemented before January 2023, and the control group was included. After that, prevention strategies were implemented, and the observation group was included for comparison of the application effects between the two groups. **Results:** The scores for prevention and control, susceptible population, transmission routes, basic knowledge of tuberculosis, and tuberculosis treatment knowledge in the observation group were significantly higher than those in the control group ( $P < 0.05$ ). The SAS and SDS scores in the observation group were significantly lower than those in the control group ( $P < 0.05$ ). **Conclusion:** The adoption of prevention strategies for new students entering school can effectively deepen students' understanding, alleviate negative psychological effects, disseminate knowledge about tuberculosis, and prevent tuberculosis, thus demonstrating promotional value.

**Keywords:** New students; Tuberculosis; Prevention strategies; Potential impacts

Tuberculosis is one of the most prevalent infectious diseases globally and poses a serious social issue. Due to its long latency period and lack of early symptoms, tuberculosis often goes unnoticed, yet it is highly contagious and can cause significant harm, potentially leading to outbreaks within communities, which is detrimental to social development<sup>[1]</sup>. Implementing effective strategies to prevent and control the disease is therefore a crucial research topic. Given the unique characteristics of school campuses, with high population density, tuberculosis prevention and control are challenging and outbreaks are possible. Recent epidemiological studies have indicated a growing probability of students

contracting tuberculosis each year. However, students themselves may lack knowledge about tuberculosis, and it may even be associated with related tumors, posing a threat to health and safety<sup>[2]</sup>. Analyzing the occurrence of tuberculosis reveals its close relationship with individual willingness, protective measures, and campus environment, all of which impact the health of teachers and students. This interference is evident in both academic advancement and employment opportunities, highlighting the need for targeted protective measures. This study focuses on new students and aims to analyze the application effects and potential impacts of preventive strategies.



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## 1. Materials and Methods

### 1.1 General Information

A study was conducted on 500 new students in our district, from September 2022 to June 2023. Among the 500 students, there were 260 males and 240 females, aged between 16 and 20 years, with an average age of  $18.13 \pm 1.30$  years. All 500 students were tracked with complete information and high compliance.

### 1.2 Methods

The control group underwent routine management, with records of student health, clear documentation of reasons for absences, and simple introductions to tuberculosis-related knowledge during health classes. The observation group, based on the control group, implemented preventive strategies, including:

#### 1.2.1 Regular Health Check-up

Early identification of tuberculosis through health check-ups. Both new students and staff should undergo regular health examinations, and health records should be maintained for each individual.

#### 1.2.2 Enhanced Health Education

The school should organize systematic and planned health education targeting both teachers and students. This education should cover knowledge and skills related to prevention and control, encouraging students to adopt healthy and regular lifestyles, emphasizing personal hygiene, and collectively maintaining school hygiene. Educating students about the hazards of tuberculosis, informing them about the consequences of concealing symptoms, and preventing the spread of tuberculosis within the school. Various educational methods such as lectures, bulletin boards, chalkboard presentations, and classroom teaching should be utilized to continuously raise awareness and improve skills.

#### 1.2.3 Emphasis on School Hygiene

Timely cleaning of the school premises according to relevant standards and specifications to ensure sufficient per capita usage area for students' living and studying. Special attention should be given to cleaning areas with high population density such as libraries, dormitories, and classrooms, ensuring thorough sanitation.

#### 1.2.4 Attendance and Morning Checks

Conducting morning checks diligently. For absentees,

reasons for absence should be investigated, registered, and followed up promptly to trace tuberculosis cases early and prevent disease transmission. Through tracking investigations, disease spread can be effectively prevented by identifying sources of infection and isolating them promptly.

#### 1.2.5 Strict Control of Sources of Infection

Tuberculosis transmission, mainly through daily coughing and tuberculosis bacilli in sputum, should be controlled. Sputum smear examination should be performed, and individuals with positive results and significant bacterial load should be identified as primary sources of infection. After detecting pulmonary tuberculosis sources, timely isolation and appropriate treatment should be provided, with the potential for non-infectiousness within a short period.

#### 1.2.6 Epidemic Management

When suspected cases arise or the first case of a diseased student appears, the epidemic should be reported to the education authority and the disease control department within one day, avoiding concealment, falsehood, or delay. Close cooperation with the disease control department should be maintained, epidemiological investigations should be conducted promptly to identify the source and transmission chain of the epidemic. If the confirmed source of infection is within the school, relevant strategies should be implemented immediately to eliminate it. Depending on the manifestation of the epidemic, appropriate measures should be taken, such as isolation of infected students, active treatment, thorough disinfection of the epidemic site, and prevention of disease outbreaks, to maintain a good educational order. In the event of an outbreak, classes should be suspended immediately, and close cooperation with administrative and disease control departments should be strengthened to control the disease as required, conduct information reporting, epidemic monitoring, and extinguish the epidemic as soon as possible to remove negative impacts and resume classes promptly.

#### 1.2.7 Management of Diseased Students

Diseased students should be isolated, and designated personnel should send them to the appropriate institution to determine the type of disease, analyze the bacterial shedding period, and clarify whether it

originated from the school. Parents should be informed promptly to pick up the students, educate them on standardized treatment and prevention, explain medication methods, notify them of regular follow-up examinations, conduct follow-up investigations, and monitor their health status. Student belongings should be thoroughly disinfected, and dormitories and classrooms of affected students should be disinfected according to requirements, using methods such as UV irradiation or drug spraying. After standardized treatment and confirmation of non-infectiousness, students should be allowed to return to school with certification from the prevention and control institution. Schools should care for and support students, establish information systems gradually, ensure continuous treatment, and guard against discrimination and other negative attitudes.

### 1.2.8 Management of Close Contacts

Close contacts with diseased students should be registered, especially those in the same class or dormitory, and medical observation should be conducted, including tuberculosis skin tests and chest X-rays. Individuals with strongly positive tuberculosis skin test results should undergo sputum examination. Latent tuberculosis infection is determined based on absence of radiological and sputum evidence, and strongly positive skin test indicates latent infection. After negative test results, close contacts should undergo re-examination three months later. Tuberculosis prevention and control institutions should provide guidance and prophylactic treatment for close

contacts, selecting appropriate preventive treatment regimens. If diagnosed with pulmonary tuberculosis, they should be treated as new cases, and the disease should be reported immediately, following necessary protocols for student management.

### 1.3 Observation Items and Indicators

Negative Emotions Evaluation: The level of anxiety was assessed using the Self-Rating Anxiety Scale (SAS)<sup>[3]</sup>, and the level of depression was assessed using the Self-Rating Depression Scale (SDS)<sup>[4]</sup>. The threshold scores for anxiety and depression were set at 57 and 55, respectively. Evaluation of Disease Knowledge Mastery<sup>[5]</sup>: Questionnaire surveys were conducted, covering preventive measures, susceptible populations, transmission routes, basic knowledge of tuberculosis, and tuberculosis treatment, with scores ranging from 0 to 100.

### 1.4 Statistical Methods

Data were processed using SPSS 27.0. ( $\bar{x} \pm s$ ) and (%) represent measurement and count data, respectively. Independent sample t-tests were used, with  $P < 0.05$  indicating statistical significance.

## 2. Results

### 2.1 Comparison of Negative Emotions between the Two Groups

After management, the SAS and SDS scores of both groups were significantly lower than before management, with a more pronounced change observed in the observation group ( $P < 0.05$ ). See **Table 1** for details.

**Table 1** Comparison of negative emotions between the two groups [ $n(\bar{x} \pm s)$ ]

Group	Example number	SAS (score)		SDS (score)	
		Before the intervention	After the intervention	Before the intervention	After the intervention
observation group	500	57.56±4.16	32.26±4.25 <sup>a</sup>	55.41±3.26	30.24±3.92 <sup>a</sup>
control group	500	57.61±4.08	43.23±3.61 <sup>a</sup>	55.53±3.17	41.26±3.81 <sup>a</sup>
<i>t</i>	/	0.192	43.990	0.590	45.077
<i>P</i>	/	0.848	0.000	0.555	0.000

Note: Compared with this group before management, <sup>a</sup> $P < 0.05$ .

### 2.2 Comparison of Disease Knowledge Mastery between the Two Groups

The observation group's scores for prevention and control, susceptible population, transmission routes,

basic knowledge of tuberculosis, and tuberculosis treatment were all significantly higher than those of the control group ( $P < 0.05$ ). See **Table 2** for details.

**Table 2** Comparison of disease knowledge between the two groups [ $n(\bar{x} \pm s)$ ]

Group	Example number	Prevention and Control (score)	Susceptible Population (score)	Route of Transmission (score)	Basic knowledge of TB (score)	Tuberculothrapy (score)
Observation Group	500	83.63±4.18	84.46±4.16	90.82±4.77	84.26±6.83	85.26±3.84
Control Group	500	72.26±4.52	73.26±3.82	82.30±3.35	72.39±4.12	73.26±3.71
<i>t</i>	/	41.296	44.343	32.685	33.276	50.254
<i>P</i>	/	0.000	0.000	0.000	0.000	0.000

### 3. Discussion

Schools are places where people gather, and the high population density makes them prone to the spread of infectious diseases<sup>[6]</sup>. Once secondary infections occur, they may lead to large-scale outbreaks<sup>[7]</sup>, disrupting the health of both teachers and students and posing challenges for prevention and control efforts<sup>[8]</sup>. Timely and accurate identification of infection sources and the implementation of appropriate measures to strengthen protection for susceptible populations are key research priorities for schools and prevention and control centers<sup>[9]</sup>.

Implementing prevention strategies can help identify infectious sources early and detect diseases promptly<sup>[10]</sup>. Analyzing the occurrence of tuberculosis in a local high school in recent years, promptly identifying problems, intensifying management efforts, and detecting tuberculosis as soon as possible are crucial steps to isolate and treat the disease, preventing clustered epidemics<sup>[11]</sup>. During protective measures, students' proactive identification can enhance prevention and control effectiveness. Tuberculosis, which is more prevalent in winter and spring, should be screened during graduations and school openings through proactive examination to detect diseased students in a timely manner. Emphasizing health education, thoroughly introducing tuberculosis-related knowledge, identifying early lesions, and preventing delayed diagnosis are essential. Detailed explanations of tuberculosis knowledge, including early symptoms and hazards, correcting misconceptions, and forming healthy habits are vital. Increasing financial investment and continuously improving prevention strategies based on relevant policies are essential. Regarding close contacts, careful screening and enhanced management around student clusters are necessary to prevent epidemic outbreaks and protect student health. The results of this study show that compared to the

control group, the observation group had higher scores for prevention and control, susceptible population, transmission routes, basic knowledge of tuberculosis, and tuberculosis treatment ( $P < 0.05$ ). This indicates that implementing prevention strategies can effectively enhance tuberculosis awareness and enable individuals to consciously protect themselves, effectively preventing the disease. The observation group also had lower SAS and SDS scores ( $P < 0.05$ ), indicating that prevention strategies can alleviate negative emotions and enable students to face tuberculosis in a positive and healthy state. This suggests that the application of prevention strategies can strengthen tuberculosis prevention and control efforts.

In conclusion, adopting prevention strategies for incoming students can effectively deepen student awareness, alleviate negative emotions, disseminate tuberculosis knowledge, and prevent tuberculosis, thus demonstrating significant potential for wider application.

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