

ORIGINAL RESEARCH

Influencing factors and knowledge related to AIDS among high-risk male population in Chongqing

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Abstract

This study aims to investigate the influencing factors and Acquired Immune Deficiency Syndrome (AIDS) related knowledge among high-risk male population in Chongqing. A total of 388 men who had sex with their fellow men (MSM) and volunteered for counseling or human immunodeficiency virus (HIV) testing in Chongqing were divided into two groups identified as: aware group (n = 299) and unaware group (n = 89). According to the study subjects, the MSM sentinel surveillance questionnaire of the Chinese Center for Disease Control and Prevention was utilized to investigate their AIDS awareness demographic and behavioral characteristics. Univariate analysis was also applied to analyze the influencing factors of their AIDS knowledge. Binary multivariate logistic analysis was further used to screen the independent risk factors of AIDS inadequate knowledge, leading to the use of regression analysis model. Furthermore, hosmer and lemeshow were employed to test the goodness and fitness of the regression analysis model. Finally, SPSS was used to draw receiver operating characteristic (ROC) curves to evaluate the predictive value of the regression analysis model. Among 388 respondents, 299 participants were aware while 89 participants were unaware of AIDS-related knowledge with an overall awareness rate of 77.06%; univariate and multivariate logistic regression analysis showed that education (high school and below) and household registration (other places) were risk factors for AIDS-related knowledge in high-risk male groups in Chongqing. In addition, a probability model predicted high incidence of AIDS in high-risk male groups in Chongqing because of inadequate AIDS knowledge: $P = 1/[1 + \exp(1.429 - 1.169X_2 - 0.969X_3)]$. The overall level of awareness of AIDS-related knowledge among high-risk male groups in Chongqing was not high because of low education levels (high school or below) and foreign household registration.

Keywords

Chongqing area; Male high-risk group; AIDS-related knowledge; Awareness; Influencing factors; Regression model

1. Introduction

Men who have sex with their fellow men (MSM) are at high risk of developing AIDS [1]. Clinical studies have found that in recent years, the incidence of AIDS in high-risk male groups in China has slowly been showing an increasing trend and the proportion of newly diagnosed patients among high risk groups is also increasing every year [2, 3]. In addition, men who have sex with their fellow men and are around 20 to 25 years of age, have relatively weak health awareness but have high sexual activities hence, leading to a greater risk of developing AIDS and other diseases due to compromised body immunity [4, 5]. The national AIDS-related prevention and control program requires that AIDS-related knowledge among high-risk groups should be more than 90% in order for it have an effective role in the prevention of AIDS [6]. In recent years,

although some achievements have been made in the prevention and control of AIDS in Chongqing, there are still some aspects that needs to be improved in the prevention and control of high-risk male groups. In particular, the expansion of AIDS-related knowledge programmes for high-risk groups of men needs to be prioritized and strengthened [7, 8].

Therefore, this study recruited men who had sex with their fellow men (MSM) in order to investigate the AIDS related knowledge and influencing factors among high-risk male groups and thereby, recommend for improved AIDS prevention and control measures for the targeted group in Chongqing.

2. Materials and methods

2.1 Clinical data

A total of 388 MSM who volunteered for counseling or HIV testing in Chongqing between January 2020 and January 2021 were selected as study participants.

2.2 Inclusion criteria

This study included men who had sex with their fellow men who lived in Chongqing for more than three months and volunteered to participate.

2.3 Exclusion criteria

This study excluded MSM who had incomplete survey data, cognitive impairment and above 25 years.

2.4 Data collection methods

The AIDS related knowledge of MSM (men who have sex with men) was collected using sentinel surveillance questionnaire of the Chinese Center for Disease Control and Prevention. The demographic and behavioral characteristics of the respondents were also collected.

In addition, there were a total of eight questions on the MSM sentinel surveillance questionnaire; with six questions answered correctly by respondents identified as “aware” of AIDS-related knowledge and two as “unaware” of AIDS-related knowledge.

2.5 Data analysis methods

The study data were analyzed and processed by SPSS 27.0. (International Business Machines Corporation, Armonk, NY, USA) Measurement data were analyzed by *t*-test and enumeration data were analyzed by χ^2 test. Multivariate regression analysis was also performed using binary logistic regression analysis model. Furthermore, hosmer and lemeshow were utilized for goodness-of-fit test of probability model and drew ROC curve to evaluate the predictive value however, the differences were statistically significant with $p < 0.05$.

3. Results

3.1 AIDS-related knowledge among high-risk male groups in Chongqing

The results of this study showed that 299 participants out of the total 388 participants had AIDS related knowledge while 89 respondents were unaware of AIDS related knowledge, representing an overall awareness knowledge rate of 77.06%.

3.2 Univariate analysis results of AIDS-related knowledge among high-risk male groups in Chongqing

The univariate analysis demonstrated that the proportion of participants in the AIDS aware group was higher than that of the AIDS unaware group. In addition, the proportion of university degree holders or higher qualifications in the AIDS aware group was higher than that of the AIDS unaware group. Furthermore, the proportion of local household registration in the AIDS aware group was also higher than that of the AIDS

unaware group and the differences were statistically significant ($p < 0.05$). These results are demonstrated in Table 1 below:

3.3 Logistic multivariate regression analysis results of AIDS-related knowledge among high-risk male groups in Chongqing

The variable: whether the males in the high-risk group in Chongqing was aware of AIDS-related knowledge or not was taken as the dependent variable. The occupation, educational background and household registration with significant differences in univariate analysis were brought into the binary logistic regression analysis model in SPSS software and the analysis results revealed that the differences in educational background and household registration were statistically significant ($p < 0.05$). Additionally, the OR (odds ratio) value of educational background and household registration were more than 1. Therefore, education (high school or below) and household registration (outside the country) were risk factors for AIDS-related knowledge among high-risk male groups in Chongqing. These results are demonstrated in Table 2 below:

3.4 Probability model for the incidence of AIDS-related knowledge among men at high risk in Chongqing

This analysis was conducted using a binary logistic multivariate regression analysis model as follows:

$$\text{Logit}(P) = \ln[P/(1-P)] = -1.429 + 1.169X_2 + 0.969X_3$$

In addition, a probabilistic model predicting the incidence of AIDS-related knowledge among high-risk male groups in Chongqing:

$$P = 1/[1 + \exp(1.429 - 1.169X_2 - 0.969X_3)]$$

These results are demonstrated in Table 3 below:

3.5 Goodness of fit test for probability model of AIDS-related knowledge in male high-risk population in Chongqing

Furthermore, the hosmer and lemeshow were used to test the goodness and fitness of the probability model and the results showed $\chi^2 = 0.040$, $p = 0.841$, indicating that the probability model fitted well. The results of this analysis are demonstrated in Table 4 below:

3.6 Predictive value analysis of the probability model of AIDS-related knowledge among high-risk male groups in Chongqing

The ROC curve analysis displayed that the prediction model had significant predictive value ($p < 0.05$), Area Under Curve (AUC) 0.933, 95% Confidence Interval (CI) and 0.892–0.974 respectively. The outcome was shown in Fig. 1.

TABLE 1. Univariate analysis results of AIDS-related knowledge among high-risk male groups in Chongqing.

Indicators	AIDS aware group (n = 299)	AIDS unaware group (n = 89)	Statistical value	p value
Age (yr)	21.36 ± 2.64	21.45 ± 2.45	0.287	0.774
Local residence time (mon)	10.25 ± 1.26	10.27 ± 1.21	0.133	0.895
Monthly income (yuan)	3300.25 ± 312.54	3305.36 ± 309.26	0.136	0.892
Occupation (n, %)				
Student	155, 51.84	32, 35.96	6.931	0.009
Not student 1	144, 48.16	57, 64.04		
Education (n, %)				
College or above	222, 74.25	55, 61.80	5.205	0.023
High School or below 1	77, 25.75	34, 38.20		
Sexual orientation (n, %)				
Homology	222, 74.25	66, 74.16	0.001	0.999
Bisexual	60, 20.07	18, 20.22		
Heterosexual	17, 5.69	5, 5.62		
Sexual role (n, %)				
Insertive role	36, 12.04	12, 13.48	0.176	0.916
Receptive role	106, 35.45	30, 33.71		
Both	157, 52.51	47, 52.81		
Age at first homosexual behavior <18 year (n, %)				
Yes	61, 20.40	18, 20.22	0.001	0.971
No	238, 79.60	71, 79.78		
Homosexual behavior in the past 3 months (n, %)				
Yes	240, 80.27	72, 80.90	0.017	0.895
No	59, 19.73	17, 19.10		
Whether sex partners came from online (n, %)				
Yes	264, 88.29	79, 88.76	0.015	0.903
No	35, 11.71	10, 11.24		
Have received AIDS prevention and treatment services in the past 6 months (n, %)				
Yes	45, 15.05	14, 15.73	0.025	0.875
No	254, 84.95	75, 84.27		
Household registration (n, %)				
Local	236, 78.93	55, 61.80	10.736	0.001
Non-local 1	63, 21.07	34, 38.20		

Note: AIDS: Acquired Immune Deficiency Syndrome.

TABLE 2. Logistic multivariate regression analysis of variables assigned to AIDS-related knowledge in high-risk male groups in Chongqing.

Factor	B	Value assignment
Knowledge of AIDS among high-risk male groups in Chongqing	Y	Binary Variables: Yes: Assign Value 1; No: Assign Value 0
Occupation	X ₁	Binary variables: non-students: assign value 1; students: assign value 0
Education	X ₂	Binary variables: high school or below: assigned value 1; college or above: assigned value 0
Household registration	X ₃	Bivariate: Non-local: Assign Value 1; Local: Assign Value 0

Note: AIDS: Acquired Immune Deficiency Syndrome.

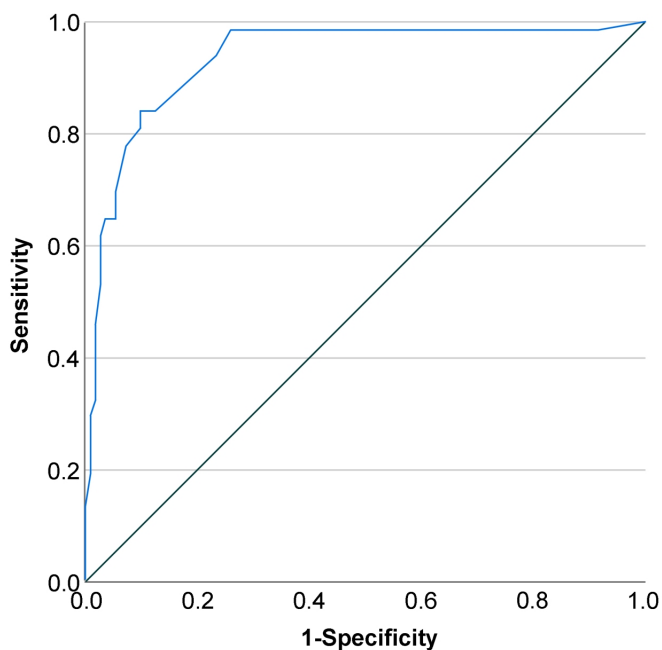
TABLE 3. Binary logistic multivariate regression analysis results.

Factor	β	Standard error	wald	p	OR value	95% confidence interval for OR	
						Lower Limit	Upper Limit
Occupation	0.006	0.032	0.031	0.859	1.006	0.944	1.071
Education	1.169	0.419	7.778	0.005	3.217	1.415	7.314
Household registration	0.969	0.372	6.767	0.009	2.635	1.270	5.466
Constant	-1.429	1.871	0.583	0.445	0.240		

OR: odds ratio.

TABLE 4. Hosmer-lemeshow test for probability models.

χ^2	p
0.040	0.841

**FIGURE 1. ROC curve of probability model of AIDS-related knowledge in high-risk male groups in Chongqing.**

4. Discussion

The findings of this study demonstrated that the high-risk male groups of MSM significantly contributed to AIDS transmission in Chongqing. According to statistics found in this study, among newly infected HIV patients in Chongqing recorded every year, the proportion of MSM showed an increased trend. However, this proportion in Chongqing was higher than the national average [9, 10]. Therefore, it is of great social and practical significance to prevent and treat diseases among MSM in Chongqing. The clinical experience suggested that increasing awareness of AIDS-related knowledge in high-risk groups exerts positive effect in the prevention and treatment of AIDS [11, 12]. In addition, this study attempts to provide effective strategies for AIDS prevention and control for high-risk male groups in Chongqing.

The results of this study showed that 299 out of 388 par-

ticipants had AIDS-related knowledge and 89 participants had little or no AIDS-related knowledge. The overall AIDS-related knowledge rate of MSM was 77.06%. This level of awareness was significantly lower than the target requirement in the “Fourteenth Five-Year Plan of Action for Prevention and Treatment of AIDS in China”. Hence, the AIDS related knowledge among high-risk male groups in Chongqing was very low and the AIDS prevention and control departments should prioritize and strengthen AIDS awareness activities. Meanwhile, this study also found that in response to the question “Will infection with other venereal diseases increase the risk of AIDS?”, more than 40% of participants were unaware and therefore, could not associate the risks of venereal infections to increased chances of developing AIDS. This suggested that the perception of the relationship between AIDS and other sexually transmitted diseases among high-risk male groups in Chongqing was not correct. Therefore, AIDS prevention and control institutions in Chongqing should further strengthen targeted AIDS prevention and control interventions through health education and public health.

In addition, this study analyzed the differences in demographic and behavioral characteristics in both groups and also the awareness rate of AIDS-related knowledge in high-risk male groups in Chongqing. The probability model of AIDS unawareness in high-risk male groups in Chongqing was constructed *via* univariate and multivariate logistic regression analysis. As implied in the results of this study, the AIDS unaware population had greater proportion of high school education or below and higher proportion of foreign household registration. Multivariate logistic regression analysis indicated that education (high school or below) and household registration (other places) were risk factors for AIDS-related knowledge among high-risk male groups in Chongqing. These results are similar to those reported in other relevant literature [13, 14].

Furthermore, this study in terms of education found that, people with higher levels of education have richer channels of obtaining knowledge and information and therefore, have more comprehensive knowledge with better grasp of AIDS-related knowledge. [15, 16]. These results suggested that there is need of paying more attention to strengthening health education and enriching the ways and forms of AIDS-related education for high-risk male groups especially to people with relatively low levels of education in Chongqing. Therefore, this could effectively improve the awareness levels of AIDS-related knowledge among low educated high-risk groups.

In terms of household registration, awareness among outside

population was relatively low, which was consistent with the results of most studies. Chongqing has achieved positive results in AIDS prevention and control in recent years. This is evidenced by improved health education work for AIDS prevention knowledge has been observed among local residents [17, 18]. However, for high-risk migrant populations with foreign household registration, participation in AIDS prevention knowledge education was not high because they paid more attention to personal needs during integration into local society as well as new environment. Therefore, AIDS prevention knowledge education to be done in the future, should further pay attention to giving targeted health education interventions to migrant population with household registration and actively encourage these populations to participate in AIDS prevention knowledge education by means of social organizations.

5. Conclusions

In summary, this study found that the overall level of awareness of AIDS-related knowledge among high-risk male groups in Chongqing was not high with the independent risk factors being low education (high school and below) and foreign household registration. Therefore, in the process of carrying out AIDS prevention and control activities in this area in the near future, targeted health promotion interventions should be given to high-risk groups with low education and foreign household registration. Furthermore, the awareness of AIDS-related knowledge should be effectively improved in order to raise the overall quality of AIDS prevention and control. This study was limited by the number of study participants however, there is need to further expand the scope of research participants in order to draw a more comprehensive research conclusion and thereby, providing a more comprehensive reference for the prevention and treatment of AIDS in Chongqing.

AVAILABILITY OF DATA AND MATERIALS

The data presented in this study are available on reasonable request from the corresponding author.

AUTHOR CONTRIBUTIONS

HBL and HX—designed the study and carried them out; supervised the data collection, analyzed the data, interpreted the data, prepared the manuscript for publication and reviewed the draft of the manuscript. All authors have read and approved the manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval was obtained from the Ethics Committee of Chongqing Medical University (2023029). Written informed consent was obtained from a legally authorized representative for anonymized patient information to be published in this article.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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