Factors Related to Tuberculosis Preventive Behaviors among Tuberculosis Patient Attendants in Dhaka, Bangladesh

เฟอร์ดัส จาฮาน[1]*, สมสมัย รัตนกรีฑากุล[2] และ ชนัญชิดาดุษฎี ทูลศิริ[2]

[1] นิสิตพยาบาลศาสตรมหาบัณฑิต (หลักสูตรนานาชาติ) สาขาการพยาบาลชุมชน คณะพยาบาลศาสตร์ มหาวิทยาลัยบูรพา
[2] กลุ่มวิชาการพยาบาลมารดา-ทารก และการผดุงครรภ์ คณะพยาบาลศาสตร์ มหาวิทยาลัยบูรพา

* ติดต่อผู้นิพนธ์: ferdous.raihan32@yahoo.com

Ferdous Jahan[1]*, Somsamai Rattanagreethakul[2] and Chanandchidadussadee Toonsiri[2]

[1] Master Degree Nursing Student in Community Nursing Pathway (International Program), Faculty of Nursing, Burapha University, Thailand
[2] Community Nursing Division, Faculty of Nursing, Burapha University, Thailand

* **Corresponding author:** ferdous.raihan32@yahoo.com

บทคัดย่อ

วัตถุประสงค์: เพื่อศึกษาความสัมพันธ์ระหว่างพฤติกรรมการป้องกันโรควัณโรค ของผู้ดูแลผู้ป่วยกับปัจจัยด้านประชากรและสังคม (อายุ เพศ การศึกษา) ด้าน ความรู้ ด้านการรับรู้โอกาสเสี่ยงการรับรู้ความรุนแรงการรับรู้ประโยชน์การรับรู้ต่อ อุปสรรค **วิธีการศึกษา:** กลุ่มตัวอย่าง คือผู้ดูแลผู้ป่วยที่พาผู้ป่วยมารับยารักษา วัณโรคที่โรงพยาบาลของรัฐบาล 2 แห่งเมืองดักก้าประเทศบังคลาเทศจำนวน 197 คนเก็บรวบรวมข้อมูลโดยการสัมภาษณ์ระหว่างเดือน มีนาคม พ.ศ. 2557 ถึง เดือนเมษายน พ.ศ. 2557 นำเสนอข้อมูลโดยสถิติเชิงบรรยายและค่าสหสัมพันธ์ เพียร์สัน **ผลการศึกษา:** กลุ่มตัวอย่างมีอายุเฉลี่ย 34.79 ปีมีอายุตั้งแต่ 18 ปีถึง 72ปี ส่วนใหญ่เป็นเพศหญิง (ร้อยละ 52.3) มีสถานภาพสมรสคู่ (ร้อยละ 83.8) นับ ถือศาสนามุสลิม (ร้อยละ 97.0) ส่วนใหญ่มีการศึกษาระดับมัธยมศึกษา (ร้อย 36.0) รองลงมาเป็นระดับประถมศึกษา (ร้อยละ 30.5) และร้อยละ 80.2 ของกลุ่ม ตัวอย่างมีรายได้ต่อเดือนไม่เกิน 20,000 ตากา (BDT) ผู้ดูแลมีความรู้ในโรควัณ โรคระดับปานกลาง (*M* = 21.37, *SD* = 4.99) มีพฤติกรรมการป้องกันโรควัณโรค ระดับปานกลาง (*M* = 16.72, *SD*= 3.14) และเมื่อทดสอบความสัมพันธ์ทางสถิติ พบว่า ระดับการศึกษา ความรู้ การรับรู้โอกาสเสี่ยง การรับรู้ความรุนแรง และ การรับรู้ประโยชน์มีความสัมพันธ์ทางบวกกับพฤติกรรมการป้องกันโรควัณโรค อย่างมีนัยสำคัญทางสถิติ (*r* = 0.391, *P* < 0.01; *r* = 0.526, *P* < 0.01; *r* = 0.300, *P* < 0.01; *r* = 0.219, *P* < 0.01; *r* = 0.179, *P* < 0.05 ตามลำดับ) สำหรับการรับรู้ ต่ออุปสรรคมีความสัมพันธ์ทางลบกับพฤติกรรมการป้องกันโรควัณโรคอย่างมี นัยสำคัญทางสถิติ (*r* = -0.424, *P* < 0.01) **สรุป:** ระดับการศึกษา ความรู้การรับรู้ โอกาสเสี่ยง การรับรู้ความรุนแรง การรับรู้ประโยชน์ และการรับรู้ต่ออุปสรรคของ ผู้ดูแลผู้ป่วยมีความสัมพันธ์กับพฤติกรรมการป้องกันโรควัณโรค ดังนั้นพยาบาล ควรจัดกิจกรรมการให้ความรู้เกี่ยวกับโรควัณโรคให้แก่ผู้ป่วยและผู้ดูแลสามารถ นำไปปฏิบัติเพื่อป้องกันและลดการแพร่กระจายของวัณโรคต่อไป

คำสำคัญ: ผู้ดูแลผู้ป่วยวัณโรค, พฤติกรรมการป้องกันโรควัณโรค, ความรู้ เกี่ยวกับวัณโรค, การรับรู้เกี่ยวกับวัณโรค

Abstract

Objective: To examine the relationships between tuberculosis (TB) preventive behavior among TB patients' attendants and their socio-demographic factors (including age, sex, and education), knowledge, perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. **Method:** A sample of 197 TB patients' attendants was recruited at the DOTS Centre from two government hospitals in Dhaka, Bangladesh during March, 2014 to April, 2014. Data were collected by face-to-face interviews with the patients' attendants. Descriptive statistics were used to describe variables and the Pearson correlation coefficient to examine the relationships. **Results:** TB patients' attendants were with an average age of 34.79 years (18 to 72 years). The majority was female (52.3%), married (83.5%), and Muslim (97.0%). About one-third had secondary school (36.0%) and primary school (30.5%) education. The majority had a monthly family income $\leq$ 20,000 taka (80.2%). The majority (41.6 %) had a moderate level of knowledge (*M* = 21.37, *SD* = 4.99) and almost half (45.2%) had a moderate level of preventive behavior (*M* = 16.72, *SD* = 3.14). Among 3 socio-demographic factors, only education had a moderate positive relationship with TB preventive behavior (*r* = 0.391, *P* < 0.01). Knowledge was strongly positively associated with TB preventive behavior (*r* = 0.526, *P* < 0.01). While perceived susceptibility, perceived severity and perceived benefit had positive relationships with preventive behavior (*r* = 0.300, *P* < 0.01; *r* = .219, *P* < 0.01; *r* = 0.179, *P* < 0.05, respectively); perceived barrier had a moderate negative relationship (*r* = -0.424, *P* < 0.01). **Conclusion:** TB patient attendants' knowledge, perceived susceptibility, perceived severity, perceived benefits, and perceived barriers were related with their TB preventive behavior. A nursing intervention program aiming at promoting knowledge, perception and preventive behavior among TB patient attendants is needed.

Keywords: tuberculosis patient's attendants, preventive behavior, knowledge, perception

Introduction

Tuberculosis (TB) has remained a major health problem worldwide, most noted in developing countries.[1] It is an infectious communicable disease caused by mycobacterium tuberculosis that primarily affects the lung and it kills approximately 4,700 people every day.[2] Globally, there was an estimate of 12 million prevalent cases of TB in 2011 and the TB prevalence rate is 170 per 100,000 population and incidence rate is 125 per 100,000 population.[3] The largest number of new TB cases occurred in Asia, accounting for

60% of new cases globally and the South East Asia region accounts for 40% of the global TB cases.[4]

Bangladesh is one of the high incidence TB burdened countries, ranking 6th on the list of 22 highest burdened TB countries in the world.[5] It is a major public health concern and it remains one of the four leading causes of mortality in Bangladesh. The World Health Organization(WHO) estimated that the TB mortality rate was 45 per 100,000 of the population in the year 2011.In addition, the incidence and prevalence rate of all forms of tuberculosis was 225 and 411 per 100, 000 population respectively in the same year.[3]

Tuberculosis can affect the people's physical and mental health and quality of life. TB patients face various problems that are social and economic in nature.[6] A higher degree of psychiatric morbidity like hopelessness, tension, anxiety, and feeling neglected by family and society is common in TB patients.[7] Females are more affected than males. Moreover, women would experience more difficulties in getting married than men unless they were fully cured of TB. Such worries pressure women not to disclose TB, because it is difficult to "marry off a girl" with TB, so silence results in transmission to others.[8] Furthermore, tuberculosis reduces economical production because it mostly affects the economically productive age group. Adult deaths place an especially high economic burden on societies. More than three-quarters of all TB cases are among people aged 15 to 54 years old, those in their prime working years. Poverty is a major cause of the disease. People with TB are often too sick and unable to work and their families have to pay for their treatment. Tuberculosis places an extraordinary burden on those affected by the disease, their families, communities and government budgets. The loss of working-age adults represents a loss of human capital and has a profound effect on household economic well being.[9]

People with TB disease are most likely to spread the bacteria.[10] Close contacts to a TB case such as those living in the same household are at higher risk of infection than casual contacts.[11,12] An attendant is a person who takes care of and lives or travels with an important person or a sick or disabled person.[13] Tuberculosis patients' attendants are high risk persons for developing TB infection because they spend time in close contact with TB patients. Most attendants spend a period of 1 - 6 hours in close contact with a patient for necessary care. That seems to be quite enough time for disease transmission if the needed preventive behaviors are not taken.[2]

Kasl and Cobb define preventive health behavior as "any activity undertaken by an individual who believes himself/ herself to be healthy for the purpose of preventing or detecting illness in an asymptomatic state".[14] Preventive health behavior generally follows a belief that such behavior will benefit the individual's health. Preventive activities can reduce the chances of acquiring a disease or illness.

Tuberculosis is a preventable and curable disease.[15] Therefore, it is essential to understand more factors which influence people to perform tuberculosis preventive behaviors for reducing the transmission of this infection. Preventive behavior is the most important measure to reduce the transmission of this disease. However several studies show that most people are not concerned. The study of Shokhaya, Sermsri, and Chompikul[16] in Thailand found that only 25.78% of people practice tuberculosis preventive behavior. Another study of Thwin and Chapman[17] showed that only 43.6% of the respondents had good preventive practices.

Due to the high rate of TB incidence, the Bangladesh TB Control Program has developed policies, strategies and guidelines for TB control. The goal is to reduce mortality, morbidity and transmission of TB until it is no longer a public health problem. Tuberculosis preventive behaviors are a principal activity to achieve this goal in order to minimize and reduce TB transmission. Although many studies conducted on TB preventive behaviors in some Asian countries, most of these investigations have been conducted outside Bangladesh. There is still a big gap of understanding regarding TB preventive behaviors and its associated factors among TB patients' attendants. Results obtained from this study can be used to plan a program aiming at preventing TB infection among the TB patients' attendants who are at risk of TB transmission.

The aim of this study was to describe and examine the relationships between TB preventive behaviors among TB patients' attendants and their socio-demographic factors, knowledge, perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. Health Belief Model (HBM) was used to guide the linkage of these factors with TB preventive behaviors.

Methods

A cross-sectional correlational study design was used to examine the relationship between TB preventive behaviors among TB patients' attendants and their socio-demographic factors (including age, sex, and education), knowledge, and perception. This study was conducted in two settings including the National Institute of Diseases of the Chest and Hospital (NIDCH) Mohakhali, and the National Centre for Tuberculosis and Research, Shamoli, Dhaka, Bangladesh. Both settings together treat 4,000 patients in the out-patient clinic service yearly and all treatment and modern diagnosis facilities are available for TB treatment. This study had been conducted from March, 2014 to April, 2014.

The sample was 197 TB Bangladeshi patient's attendants who were living with and came to the hospital with patients at the select settings. They were selected using a random sampling according to time selection technique. Approximately, 117 of 197 participants (59%) were collected from the first setting and 41% (n = 80) from the second setting. The sample size was calculated based on power analysis using the acceptable level of significance at $\alpha < 0.05$ and expected power $(1 - \beta)$ at 0.80.[18] The inclusion criteria for sample selection were 1) attendants living with TB patients in the same house, 2) aged 18 years or over, 3) being able to speak and understand Bengali language, 4) willing to participate in the study, and 5) having no past history of TB or cured TB.

Instruments

Data were collected by using a structured face-to-face interview questionnaire including the TB patient's attendants knowledge about TB, perception on TB, and preventive behaviors of TB. Socio-demographic information to be collected included age, sex, occupation, educational, marital status, religion, and family income.

Questionnaire on knowledge about TB was used to measure TB patient's attendants' knowledge about TB cause, mode of transmission, symptom, diagnosis, and treatment. The questionnaire was developed by Thwin and Chapman.[17] It consists of 30 items with true-false-do not know answer. Every correct answer was given a score of 1 and incorrect or "do not know" answer a score of 0 with a total score ranging from 0 to 30. The knowledge score was interpreted as follows: 1) $\geq$ 80% of the total score (high level of knowledge), 2) 60 - 79 % of the total score (moderate level of knowledge), and 3) < 60% of the total score (low level of knowledge). The instrument was developed in English and had been translated into Bengali language by backward translation.[19] The Kuder-Richardson formula 20 (KR-20) coefficient indicating reliability presented in a previous study was 0.8458. In this study, the reliability of this questionnaire, tested in the pilot study with 30 samples was acceptable with a KR-20 coefficient of 0.7921.

Questionnaire on perception on TB was used to measure perceived susceptibility, perceived severity, perceived benefits, and perceived barrier of TB preventive behaviors among TB patient's attendants. The questionnaire was developed by Thwin and Chapman.[17] This instrument had a total of 16 items (5 perceived susceptibility items, 4 perceived severity items, 2 perceived benefits items and 5 perceived barrier items). The questionnaire was used to assess the patients' attendants' perception on TB. The answer was presented as a three-point response scale (0-disagree, 1-uncertain, and 2-agree). The instrument was developed in English and had been translated in to Bengali language by backward translation.[19] An acceptable reliability of the original instrument was found in Thwin and Chapman study[17] with a Cronbach's alpha coefficient of 0.7601. In this study, the coefficient found in a pilot test with 30 subjects was 0.811.

Questionnaire on preventive behaviors of TB was used to measure TB preventive behaviors among TB patient's attendants. The questionnaire was developed by Thwin and Chapman.[17] This instrument included 7 items with 3-point response scales ranging from 1-never to 3-always. The total score was 21 with a possible range of 7 – 21. The TB preventive behaviors score was interpreted as follows: 1) $\geq$ 80% of the total score (high level of preventive behaviors), 2) 60 - 79 % of the total score (moderate level of preventive behaviors), and 3) < 60% of the total score (low level of preventive behaviors). The instrument was developed in English and had been translated in to Bengali language by backward translation[19]. Cronbach's alpha coefficient found in a previous study was 0.8081. In this study, the coefficient found in a pilot test with 30 subjects was 0.804.

Data collection

This study was approved by the Institutional Review Board (IRB) faculty of nursing, Burapha University (IRB No. 05-01-2557, Feb. 18, 2014). After getting the permission from authorities of the institute of both settings, the researcher trained one of the out-patient department (OPD) nurses to be a research assistant and demonstrated her how to collect data accurately. Data collection took place at the OPD for DOTS service during TB patient and their attendants waited to receive DOTS service. The researcher explained the aim, procedure, benefit and safety of this study to the participants. It was assured that each participant had the right to refuse to participate or to withdraw from the study at any time and also that the data will not be used for any other purpose. Finally, the researcher recruited the TB patients' attendants, who met the inclusion criteria and were willing to participate in the study with signed consent form. A face-to-face interview of 20 - 30 minutes was conducted.

Data analysis

All data were analyzed by using a statistical package for social science (SPSS). Statistical significance level was at level of .05. Descriptive statistics frequency, percentage, means and standard deviation were used to describe demographic variables to interpret the knowledge and perception score. The Pearson correlation coefficient was used to examine the relationships between age, sex, education, knowledge, perception (perceived susceptibility, perceived severity, perceived benefits and perceived barrier) and TB preventive behaviors.

Results

A total of 197 TB patients' attendants who met the inclusion criteria were recruited for this study. The TB patients' attendants had an average age of 34.79 years with a range of 18 to 72 years (Table 1). The majority were female (52.3%), married (83.5%) and Muslim (97.0%). About one-third (36.0%) had secondary school and primary school (30.5%) education. In addition, the majority had a monthly family income of $\leq$ 20,000 taka ($\leq$ 205 USD) (80.2%). Among these attendants, 28.9% were parents of the patients, and 25.9% were the patients' child.

Knowledge about TB

The results revealed that mean score of knowledge about TB among patients' attendants was 21.37 (SD = 4.99) (Table 2). There was 41.6% of them with a moderate level of knowledge; while 37.6% with a high level and only 20.8% a low level of knowledge about TB.

Table 1 Socio-demographic characteristics of TB patients' attendants (N = 197)

Characteristics	Frequency	Percentages
Age (years)		
$\leq$ 19	3	1.5
20 - 29	77	39.1
30 - 39	54	27.4
40 - 49	36	18.3
50 - 59	18	9.1
$\geq$ 60	9	4.6
Mean = 34.79; SD = 11.28; range = 18 – 72		
Sex		
Female	103	52.3
Male	94	47.7
Marital status		
Married	165	83.8
Single	23	11.7
Divorced/ Widow	9	4.5
Religion		
Muslim	191	97.0
Hindu	6	3.0
Education		
No education	26	13.2
1-5 years (Primary school)	60	30.5
6-10 years (Secondary school)	71	36.0
> 10 years (High school)	40	20.3
Monthly income BDT/month		
$\leq$ 20,000	158	80.2
20,001 - 40,000	32	16.3
$\geq$ 40,001	7	3.5
Relation with TB patients		
Parents	57	28.9
Childs	51	25.9
Siblings	44	22.3
Spouse	32	16.3
Others	13	6.6

Table 2 Description of TB patients' attendants knowledge about TB and TB preventive behavior (N = 197)

Item	Frequency	%	Mean	SD
Knowledge about TB			21.37	4.99
High level (> 23 scores)	74	37.6		
Moderate level (18 - 23 scores)	82	41.6		
Low level (< 18 scores)	41	20.8		
TB Preventive behaviors			16.72	3.14
High level (> 16 scores)	86	43.6		
Moderate level (13 - 16 scores)	89	45.2		
Low level (< 13 scores)	22	11.2		

Perception on TB

The majority of TB patients' attendants had a high level of perceived susceptibility (76.1%), high level of perceived severity (42.6%), high level of perceived benefit (55.3%) and high level of perceived barriers (40.1%) (Table 3).

Table 3 Description of TB patients' attendants perception on TB (N = 197)

Item (with associated score)	Frequency	%	Mean	SD
Perceived susceptibility			8.31	2.20
High level (> 7.9)	150	76.1		
Moderate level (6 – 7.9)	25	12.7		
Low level (< 6)	22	11.2		
Perceived severity			6.12	1.98
High level (> 6.3)	84	42.6		
Moderate level (4.8 – 6.3)	76	38.6		
Low level (< 4.8)	37	18.8		
Perceived benefits			3.14	1.17
High level (> 3.1)	109	55.3		
Moderate level (2.4 – 3.1)	38	19.3		
Low level (< 2.4)	50	25.4		
Perceived barriers			5.79	3.43
High level (> 7.9)	79	40.1		
Moderate level (6 – 7.9)	51	25.9		
Low level (< 6)	67	34.0		

Tuberculosis preventive behaviors

The statistics revealed that the mean score of TB preventive behaviors among TB patients' attendants was 16.72(SD= 3.14) (Table 2). Almost a half (45.2 %) had a moderate level of preventive behaviors while 43.6 % had a high, and 11.2 % had a low level of TB preventive behaviors.

Correlation between socio-demographic, knowledge, perception, and TB preventive behavior

From table 4, it was found that among three socio-demographic factors, only education had a moderate positive relationship with TB preventive behaviors (r = 0.391, P < 0.01). Knowledge had a strong positive relationship with TB preventive behavior (r = 0.526, P < 0.01). According to four constructs of the health belief model, only three constructs, namely perceived susceptibility, perceived severity and perceived benefit had positive relationships with TB preventive behavior (r = 0.300, P < 0.01; r = 0.219, and P < 0.01; r = 0.179, P < 0.05, respectively). However, perceived barrier had a negative moderate relationship with TB preventive behavior (r = -0.424, P < 0.01).

Table 4 Correlation coefficient (r) among select factors with TB preventive behaviors (N = 197)

Variables	TB preventive behaviors Correlation coefficients (r)
Age	-0.009
Sex	0.077
Education	0.391**
Knowledge	0.526**
Perceived susceptibility	0.300**
Perceived severity	0.219**
Perceived benefit	0.179*
Perceived barrier	-0.424**

Note: ** Correlation is significant at the 0.01 level. * Correlation is significant at the 0.05 level.

Discussions and Conclusion

This study described and examined relationships between the socio-demographic factors, knowledge, perceived susceptibility, perceived severity, perceived benefits, and perceived barriers and TB preventive behaviors among TB patients' attendants in two government hospitals in Dhaka, Bangladesh. Most of the TB patients' attendants had a moderate level of knowledge and perception on tuberculosis. Only 43.6% practiced a high level of TB preventive behavior. Among three socio-demographic factors, only education had a moderate positively significant correlation with TB preventive behaviors (r = 0.391, P < 0.01). Tuberculosis preventive behavior was higher in those who had higher education. It might be the reason that education increases individual level of knowledge and a good level of knowledge stimulates and creates awareness. It might be that educated persons have more access to TB information and they have a good job to provide money for a better quality of life. Sokhanya, Sermsri, and Chompikul[16] indicated that a high level of education and better occupation classes had better TB preventive behavior. Moreover educated persons are more aware of preventive behaviors.[16] Thwin and Chapman[17] indicated that more educated the higher consciousness in preventing TB. Das and colleagues supported that the literacy status had a significant influence on awareness about TB.[20]

In addition, tuberculosis preventive behavior was higher in those who had a high level of knowledge on TB. It might be that high level of knowledge that influenced them to perform TB preventive behaviors. This could be explaining that having a good TB knowledge affected those practicing good TB preventive behaviors. Thwin and Chapman[17] indicated that good TB knowledge affect TB patients' attendants for good preventive behaviors. This study finding is consistent with the study of Sokhanya, Sermsri, and Chompikul[16] which was conducted in Thailand, their finding was a strongly significant association between TB knowledge and TB preventive behaviors.

The result of this study found that perceived susceptibility had statistically significance positive moderate relationships (r = 0.300, P < 0.01) with TB preventive behaviors. According to health belief model, the dimension of perceived susceptibility measures an individual's subjective perception of his or her risk of contracting a health condition.[21] It might

be the reason that almost all TB patients' attendants perceived that everyone has equal chance in getting TB. Most of the TB patients' attendant knew that TB is an infectious diseases caused by bacteria and it can be transmitted by respiratory system and they perceived on the risk of TB affecting their health.

Regarding perceived severity, the finding of this study revealed that there was a statistically significant positive relationship with TB preventive behaviors. (r = 0.219, P < 0.01). It might be the reason that when individuals internalize the threat of TB and focus on the severity and susceptibility of disease, this raises awareness levels among them. In addition, this study found 82.2% perceived that TB is dangerous and can lead to death and 92.4% perceived that delay treatment can be fatal. This finding was consistent with Glanz, Lewis, and Rimer[21] indicated that combination of severity and susceptibility has been labeled the perceived threat.

Perceived benefit of TB was statistically significance poor positive relationship (r= 0.179, P < 0.05) with TB preventive behaviors. According to the health belief model, the particular course of action taken will depend upon beliefs regarding the effectiveness of the various available actions in reducing the disease threat and the perceived benefits of taking the health action.[21] It could be that the fear of disease threat and perceived benefits of TB preventive behavior is stimulating the individual to practice the recommended preventive action. Almost 86.6% of TB patients' attendants perceived benefit from covering the mouth and nose if someone who had TB cough or sneeze beside them. This study finding was supported with Solliman et al.[22] indicated that 68.2% of respondents agreed that wearing a face mask can prevent transmission of TB from one person to another. Perceived barrier, one of negative perception influencing factors in this study, had negative moderate relationships with TB preventive behaviors (r = -0.424, P < 0.01). In addition, the findings showed that TB preventive behaviors were high in those who had a low barrier. This might be the reason TB patients' attendants had higher perception about disease threat, severity and benefit. The combination of severity and susceptibility has been labeled the perceived threat.[21] when individuals internalize the threat of TB and focuses on the severity and susceptibility of disease, this raises awareness and they try to avoid this threat. The fear of disease threat and perceived benefits of TB preventive

behavior are stimulating the individual to practice recommended preventive action. The current study also identified that poverty was the main barrier of TB preventive behaviors. The majority of TB patients' attendants (67.0%) were agreed with the statement of "I am so poor to have balanced diet though I want have well balanced diet". This finding supported with 80.2 % had a monthly family income ≤ 20,000 taka (≤ 205 USD).

The Health Belief Model suggests that modifying variables affect health-related behaviors indirectly by affecting perceived seriousness, susceptibility, benefits, and barriers. Age is most important personal modifying factor that affects the health but among this three variables age and sex did not support. The finding of this study showed that there was no relationship between the age and TB preventive behaviors (r = -0.009, P = 0.905). This might be because of the urban environment of the population in this study were urban dwellers and most of them were adults from 18 to 59 years old. Furthermore, the results of this study showed that there was no relationship between sex (r = 0.077, P = 0.282) and TB preventive behaviors. This also might be cause of urban dwellers and adulthood. In urban area, all age and sex people are equally access the health information. Urban dwellers are more aware and they share information among their all member in the family and they have more educational facility. Tasnim, Rahman, and Hoque[7] indicated that urban setting population had better opportunity to access to information and education.

The results of this study indicated TB patients' attendants had a moderate level of knowledge, a moderate level of perception, and a moderate level of TB preventive behaviors. Therefore, development of a nursing intervention program, aimed at promoting knowledge and perception on TB could have benefits for preventing TB infection among TB patients' attendants who are at risk of TB infection. This study could be integrated into a nursing curriculum focusing on TB preventive behaviors and associated factors among TB patients' attendant who are living with a TB patient. Especially, nursing students who would know how to educate and raise perception, as well as increase TB preventive behaviors. In addition, nurse administrators should encourage their staff to create the proper guild-line to reduce TB transmission.

Regarding limitation, since the TB patients' attendants were recruited at the DOTS center from two government

hospitals in capital city, Dhaka, Bangladesh, it may not be appropriate to generalize the findings to a broader, especially a rural area. Therefore, a comparative study designed between urban and rural areas should be conducted. Finally, a study with predictive design, rather than a correlation design as in this current study, is needed.

Conclusion

The study found a moderate level of knowledge, perception, and TB preventive behaviors among TB patients' attendants. Knowledge, perceived susceptibility, perceived severity, and perceived benefits were significance positive relationships with TB preventive behaviors. However, the study revealed that perceive barrier was a significant negative relationship with TB preventive behaviors. Therefore, development of a nursing intervention program, aimed at promoting knowledge and perception of TB that would have benefits for preventing TB infection among TB patients' attendants, is needed.

References

1. Christina M, Doming B, Ong-Lim AL. A descriptive study of the knowledge, attitude and practices on tuberculosis among treatment partners of paediatric patients in Tarlac city. *Paed Infect Dis Soc of the Philippines J* 2009;10(1):1-7.

2. Sabir SA, Naseem U, Abideen ZU, Chisti MJ. Assessment of "Tuberculosis Preventive Knowledge" in persons taking care of TB-patients. *J Rawalpindi Med Coll* 2012;16(1):62-64.

3. World Health Organization [WHO]. Global tuberculosis report 2012. (Accessed on Jan. 10, 2013, from apps.who.int/iris/bitstream/10665/75938/1/9789241564502_eng.pdf)

4. National Tuberculosis Control Program [NTP]. Tuberculosis control in Bangladesh: Annual report 2012. Dhaka, Bangladesh. Directorate General of Health Services, Mohakhali, Dhaka - 1212.

5. Zaman K. Tuberculosis: A global health problem. *J Health Pop Nutr* 2010;28(2):111–113.

6. Dhuria M, Sharma N, Ingle GK. Impact of tuberculosis on the quality of. *Indian J Comm Med* 2008;33(1):58–59.

7. Tasnim S, Rahman A, Hoque FMA. Patient's knowledge and attitude towards tuberculosis in an urban setting. 2012. (Accessed on Dec. 31, 2012, from http://dx.doi.org/10.1155/2012/352850)

8. Karim F, Johansson E, Diwan VK, Kulane A. Community perceptions of tuberculosis: A qualitative exploration from a gender perspective. *Pub Health* 2010;125:84–89.

9. Laxminarayan R, Klein E, Dye C, Floyd K, Darley S, Adeyi O. Policy Research Working Paper: Economic benefit of tuberculosis control. 2007. (Accessed on Aug., 2007, from www.who.int/management/EconomicBenefitofTuberculosisControl)

10. Centers for Disease Control and Prevention [CDC]. Questions and answers about TB introduction. 2012. (Accessed on Dec. 21, 2012, from www.cdc.gov/tb/publications/faqs/qa_introduction.htm)

11. Narasimhan P, Wood J, MacIntyre CR, Mathai D. Risk factors for tuberculosis. *Pulm Med* 2013. (Accessed on Jan. 5, 2013, from http://dx.doi.org/ 10.1155/2013/828939)

12. Triasih R, Rutherford M, Lestari T, Utarini A, Robertson CF, Graham S M. 2012. Contact investigation of children exposed to tuberculosis in South East Asia: A systematic review. (Accessed on Oct. 2, 2011, from doi:10.1155/2012/301808)

13. Oxford Dictionary. Oxford Advanced Learner's Dictionary (8th ed). 2013. (Accessed on Jan. 10, 2014, from oald8.oxfordlearnersdictionaries. com/dictionary/attendant_1)

14. Glanz K, Barbara K, Rimer BR, Viswanath K. Health behavior and Health education: Theory research and practice (4th ed.) San Francisco. Jossey-Bass, 2008.

15. Park K. Preventive and social medicine (17th ed). Jabalpur. Banarsidas Bhanot, India. 2003.

16. Sokhanya I, Sermsri S, Chompikul J (2008). TB preventive behavior of patients consulting at the general out-patient department at Paholpolpayuhasana hospital, Kanchanaburi province, Thailand. *J Pub Health Develop* 2008;6(1) 59-68.

17. Thwin HT, Chapman RS. Preventive behaviors of tuberculosis among Myanmar migrants at Muang District, Phuket Province, Thailand. Master's thesis. College of Public Health Sciences, Chulalongkorn University, 2009.

18. Polit DF, Hungler BP. Nursing research: Principles and methods (6th ed.). Philadelphia. Lippincott, 1999.

19. Yu DSF, Lee DTF, Woo J. Issues and challenges of instrument translation. *Western J Nurs Res* 2004;26(3):307-320.

20. Das P, Basu M, Dutta S, Das D. Perception of tuberculosis among general patients of tertiary care hospitals of Bengal. *Lung India* 2012; 29(4):319–324.

21. Glanz K, Lewis FM, Rimer BK. Health behavior and health education (2th ed.). San Francisco. Jossey-Bass, 1999.

22. Solliman MA, Hassali MA, Al-Haddad M, et al. Assessment of knowledge towards tuberculosis among general population in North East Libya. *J Appl Pharm Sci* 2012;2(4):24-30.