Impact of Coronavirus Pandemic among Elderly with Pulmonary Tuberculosis in Lipa City, Batangas Philippines

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Abstract – Being a family of viruses that cause respiratory infections, elderly people suffering from pulmonary tuberculosis are at high risk of contracting the coronavirus as it is a disease which affects the lungs. It is upon this background that the researcher embarked on determining the Impact of Coronavirus Pandemic among Elderly with Pulmonary Tuberculosis (PTB) in Lipa City, Batangas, Philippines. A sample of 120 elderly people (60-90years) with pulmonary tuberculosis in Lipa City was obtained using multi-stage sampling technique. The instrument for data collection was a self-developed and structure questionnaire and an interview guide. Descriptive analysis (via use of SPSS software) was employed in analyzing the data collected from the study respondents. Data generated suggests physical health attributes such as consistent fever and coughing were sometimes experienced by a greater proportion of the respondents under study. More also, isolation of self from people by staying at home was the social attribute of most of the respondents with a 2.97 means score. Compliance to Directly Observed Therapy was at a high rate (100%) as drug were mostly taken by themselves; being in a very mutual relationship with the healthcare workers. The drugs taken by theses respondents included ethambutol, rifampin, isoniazid, pyrazinamide and streptomycin. Nevertheless, the more than half of the respondents (54.2%) experienced recurrence of PTB one year after receiving their first treatment of PTB. Notwithstanding, it is key for the management of health care facilities to organize, coordinate and facilitate health education on PTB among patients as well as their families.

Keywords –Coronavirus, Elderly, Impact, Pandemic, Pulmonary Tuberculosis.

INTRODUCTION

The coronavirus existing as a family of viruses that cause respiratory infections has for the past two decades been linked with significant maladies in East Asia and the Middle East. These maladies linked with the coronavirus are the severe acute respiratory syndrome (SARS) and the Middle East respiratory syndromes (MERS) which began to emerge in 2002 and 2012, respectively [1]. Consequently, the novel coronavirus is also a severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) responsible for the coronavirus disease. This disease was finally declared a global epidemic by World Health Organization on the 11th March, 2020 after it was first reported on the 31st December, 2019 [2].

Globally, the virus responsible for the COVID-19 pandemic was discovered to have a record of over 49.9 million cases with greater proportion of these cases recorded in United States of America [3]. However, COVID-19 cases staggered above 1, 295 confirmed cases in in Lipa City as recoveries were above 1,164 while death toll is below 35 as of November 8, 2020. [3]. Between March 2020 and October 2020, the Philippines recorded 362,000 recoveries of Covid-19

cases. Nevertheless, despite having a global mortality rate of 1.25 million, the world still has a recovery rate of 32.8 million in all covid-19 cases [3].

According to report by the Centers for Disease Control and Prevention [4], individuals with certain medical disorders are highly prone to contracting the coronavirus. It was also reported that cancer, chronic kidney disease, chronic obstructive pulmonary disease (COPD), heart conditions, and immune-compromised conditions from solid organ transplant, severe obesity (BMI $\geq$ 40kg /m2), pregnancy, sickle cell disease, smoking and type 2 diabetes mellitus in individuals place then at a high risk of being infected. Therefore, it is valid to say that elderly people suffering from pulmonary tuberculosis are at high risk of contracting the coronavirus as it is a disease which affects the lungs.

Pulmonary tuberculosis in the elderly has increasingly become a major issue globally [5]. The condition, defined as a communicable disease caused by *Mycobacterium tuberculi* was detected in between 62% and 64% of the world's elderly resulting in 62% of deaths among the elderly [6, 7, 8, 9]. Gweil *et al.* [10] add specifically that, about 75% of elderly persons with

tuberculosis manifest pulmonary tuberculosis. The World Health Organization [11] reported that high records of TB incidences globally were common among individuals between 45years and 55year of age. Also, TB incidences in the Western Pacific Region, Eastern Mediterranean and Southeast Asia peaked highest among individuals aged 65 years old and above. Consequently, these rates do not differ from those from reviews of all national TB prevalence studies in Asia, America, the eastern Mediterranean and western Pacific regions with progressively increasing pulmonary tuberculosis occurrences amongst people aged 65years and above [12]-[14].

Specifically, the Philippines has the ninth highest global prevalence burden of pulmonary tuberculosis (PTB) among the elderly with 554 cases per 100, 000 reported between 2014 and 2018 [15]-[17]. Snow *et al*. [18] reports that this prevalence rate has not declined significantly since 2007. Winston and Navin [19] indicate that these rates could be as a result of factors like higher childhood or early adulthood TB transmission rates among present elderly. Pulmonary tuberculosis has become global epidemic affecting elderly people of all sexes, races, occupations in all geographical locations of the world. Furthermore, due to the copied western lifestyles, PTB is also a common disease in Philippines and not just in Europe and United States of America. World Health Organization [20] declared pulmonary tuberculosis to be an international pandemic affecting at least 75% of elderly people in the world and is increasing in prevalence. Related with healthcare expenditures among individuals aged 65years, PTB remains a clinical/public health problem. It has challenged both national and state health care resources and its economic burden is so high in the face of the present economic recession. However, the true prevalence of PTB in Lipa City, Batangas, Philippines is unknown and is likely to be underrepresented as national sampling usually under-investigates most areas.

Certain factors have been noted by [21] to trigger the rapid prevalence of PTB suffered by the elderly in under-developed and some developing countries. These factors include age, poverty, malnutrition, presence of comorbidities, institutionalization, and immunosuppressive therapy [22]. Moreover, diabetes and chronic obstructive pulmonary disease increases the chances of elderly people developing pulmonary TB as well as being infected with the coronavirus [23]. Therefore, elderly people with pulmonary TB are faced with a greater challenge since Covid-19 emerged in 2019. It is upon this background that the researcher aims at determining the impact of coronavirus pandemic on elderly with pulmonary tuberculosis (PTB) in Lipa City, Batangas, Philippines.

OBJECTIVES OF THE STUDY

The main purpose of this study is determining the impact of coronavirus pandemic among elderly with pulmonary tuberculosis (PTB) in Lipa City, Batangas, Philippines. Specifically, it will determine the health attributes of PTB among the elderly; ascertain the compliance to directly observed therapy (DOT) among elderly people with PTB; to identify the directly observed therapies (DOTs) used among elderly with PTB; identify the recurrence of PTB among the elderly.

MATERIALS AND METHODS

Study design, Participants and Setting

The study employed a descriptive cross sectional survey design. The study population comprised of all patients with pulmonary tuberculosis resident in Lipa City, Batangas, Philippines. This summed up to 215 patients.

Elderly patients between age group of 60 and 90 years of age were reviewed as well as clinic records related to them. This age group were selected because they showed atypical signs and symptoms of pulmonary tuberculosis. Only patients who lived in Lipa City Batangas, Philippines for more than 1year were recruited for this study.

Consequently, the accessible population used for this study comprised of only those patients suffering from pulmonary tuberculosis who were willing to provide quality information on the variables under study.

Sampling technique

Statistically, the study utilized multi-stage sampling technique in order to recruit the respondents used for this study. This was applied at the initial stage as the whole population of patients with medical conditions were assessed. Thereafter, the critical case sampling technique was used to determine the sample for the study. Using Taro Yamane's formula for sample obtainment (as shown below), the sample size was calculated to be 140 patients

Taro Yamane's formula for sample obtainment.

$$n = \frac{N}{1+N(e^2)}$$

Where, N = population size

e = significance coefficient = 0.05

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The sample size reduced after purposive sampling technique was employed to recruit participants used for this study. Only 120 elderly patients with pulmonary tuberculosis (PTB) in Lipa City, Batangas, Philippines were willing to participate in the study. This formed the sample used for this study.

The sampling criteria was that only patients who have a confirmed diagnosis of pulmonary tuberculosis. Similarly, patients' elderly aged sixty and above were chosen to participate in the study after provision of informed consent was made. Patients who had been admitted longer than two years were excluded from participating in the study.

Instrument for data collection

A twenty-five (25) itemed self-developed and structured questionnaire as well as an interview guide were used to obtain data from the study participants for the variable under study. The instrument was presented to the research supervisor who assured face and content validity was achieved by constructing the instrument to be in line with the study objectives. The instruments were further reviewed by a panel of experts and then validated by conducting a pilot study on a sample size.

Statistical analysis

Descriptive statistical analysis was performed using the Statistical Package for Social Sciences (SPSS). Descriptive statistical analysis was carried out on the demographic information, prevalence, risk factors and outcomes of pulmonary tuberculosis among the elderly in Lipa City, Batangas, Philippines.

Ethical consideration

In order to ensure the protection of the patients' ethical rights, letters of introduction were obtained from the health and research board of the Philippines and the Research and Ethics Committee, introducing the researcher and approving the study respectively. Permission was also sought from the chairmen of the Hospital Authorities to use their facilities for data collection. Participation in the research was purely voluntary and patients were assured of anonymity and freedom from punishment should they refuse to participate. Verbal and implied consent was obtained from the participants. Participants were also informed that they could withdraw from the study without being penalized.

RESULTS AND DISCUSSION

All 100% participants responded well. Results were presented in tables using simple frequencies and percentages as well as the use of bar chart.

Table 1.1. Physical Health Attributes of Pulmonary Tuberculosis among Elderly

Indicators	WM	VI	Rank
1. Feel feverish and cough consistently.	2.16	Sometimes	1
2. Experience blurry vision.	1.49	Never	6
3. Hearing become impaired after being diagnosed with pulmonary tuberculosis.	1.31	Never	7
4. Feel weak during exercises after being diagnosed with pulmonary tuberculosis (PTB).	2.01	Sometimes	2
5. Blood pressure surpass the normal weekly.	1.20	Never	8
6. Weak due to the consistent reduction in the potassium level of your body.	1.78	Sometimes	4
7. Loss a lot of weight.	1.88	Sometimes	3
8. Sweat excessively at night.	1.50	Sometimes	5
Composite Mean	**1.67**	**Sometimes**	

Legend: 3.50 – 4.00 = Always; 2.50 – 3.49 = Often: 1.50 – 2.49 = Sometimes; 1.00 – 1.49 = Never

Table 1.1 displays the physical health attributes of PTB among elderly with pulmonary tuberculosis (PTB) in Lipa City, Batangas, Philippines. The composite mean of 1.67 indicates that they sometimes experienced the following, fever and consistent coughing, blurry vision, impaired hearing, weakness high blood pressure, reduction of potassium, weight loss and excessive sweating. Among the items cited, feeling feverish and coughing consistently obtained the highest mean score of 2.16 and were experienced sometimes. It was followed by feel weak during exercise after being diagnosed with PTB and loss a lot of weight. Therefore, the physical attributes of PTB among elderly people in Lipa City, Batangas, Philippines is not too dire. This implies that the health attributes of the elderly people suffering from PTB can be improved upon if compliance to treatment is high among the subjects under study.

Table 1.2. Social Health Attributes of Pulmonary Tuberculosis among Elderly

Indicators	WM	VI	Rank
1. Consistently isolating yourself from people by staying at home.	2.97	Often	1
2. Lost a lot of friends due to PTB.	1.28	Never	4
3. Stopped from attending meetings of the social groups you belong to	2.58	Often	2
4. Loss of job because of PTB.	2.13	Sometimes	3
5. Closed business due to the stigmatization I experienced when my customers discovered I had PTB	1.00	Never	5
Composite Mean	**1.99**	**Sometimes**	

Legend: 3.50 – 4.00 = Always; 2.50 – 3.49 = Often: 1.50 – 2.49 = Sometimes; 1.00 – 1.49 = Never

The social health attributes of PTB among elderly with pulmonary tuberculosis (PTB) in Lipa City, Batangas, Philippines is displayed in Table 1.2. The composite mean of 1.99 indicates that the elderly people with PTB in Lipa City often isolated themselves from people by staying at home and were stopped from attending meetings of the social group they belonged. Among the items cited, consistent isolation of self from people by staying at home and stoppage from attending meetings of social groups they belonged to have the highest mean score of 2.97 and 2.58 respectively. These two social attributes were also often experienced among elderly people in Lipa City, Batangas, Philippines. Nonetheless, more than half of them never experienced loss of friends (1.28) and closure of business due to stigmatization by customers (1.00). Therefore, the attributes of that could hamper socially with the welfare and health of elderly people with PTB in Lipa City were consistent isolation from people, stoppage of elderly people from attending meetings of social groups they belong to and loss of jobs because of PTB.

Table 1.3. Emotional Health Attributes of Pulmonary Tuberculosis **Among Elderly**

Indicators	WM	VI	Rank
1. Angry because of the way people avoid you.	1.21	Never	8
2. Feel betrayed by my loved ones because I am suffering from PTB.	1.20	Never	9.5
3. Being a PTB patient leaves me sad daily.	1.77	Sometimes	2
4. Anxiety level increased after being diagnosed with PTB.	1.56	Sometimes	4
5. Feel neglected and rejected at time.	1.20	Never	9.5
6. Mentally stressed out.	1.87	Sometimes	1
7. Lost my self-esteem after being diagnosed with PTB.	1.61	Sometimes	3
8. Depressed because of my PTB-related experiences in life.	1.41	Never	5
9. Ever felt like committing suicide after knowing you had PTB.	1.25	Never	6
10. Easily forget things after being diagnosed with PTB.	1.24	Never	7
Composite Mean	**1.43**	**Never**	

Legend: 3.50 – 4.00 = Always; 2.50 – 3.49 = Often: 1.50 – 2.49 = Sometimes; 1.00 – 1.49 = Never

Table 1.3 is used to present the emotional health attributes of PTB among elderly with pulmonary tuberculosis (PTB) in Lipa City, Batangas, Philippines. The composite mean of 1.43 indicates that they never

experienced the following; anger because of the way people avoided them, feeling betrayed by loved ones, feeling of neglect and rejection, depression, feeling suicidal and amnesia (forgetting thing) because of PTB ailment. Among the items cited, mentally stressed out (1.87), being sad daily as a PTB patient (1.77), loss of self-esteem (1.61) and increased anxiety levels (1.56) had high mean scores and were experienced sometimes. Therefore, the emotional attributes of PTB among elderly people in Lipa City, Batangas, Philippines is not that deteriorating. This implies that the elderly people suffering from PTB can be seen as being emotionally mature to handle the negative outcomes associated with PTB.

Table 1.4. Summary Table on Health Attributes of Pulmonary Tuberculosis Among Elderly

Indicators	Weighted Mean	Verbal Interpretation	Rank
1. Physical	1.67	Sometimes	2
2. Social	1.99	Sometimes	1
3. Emotional	1.43	Never	3
Composite Mean	**1.70**	**Sometimes**	

Legend: 3.50 – 4.00 = Always; 2.50 – 3.49 = Often: 1.50 – 2.49 = Sometimes; 1.00 – 1.49 = Never

In summary, results in Table 1.4 revealed the health attributes of pulmonary tuberculosis (PTB) among elderly people in Lipa City, Batangas, Philippines. In the Table 1.4, the health attributes are divided into three groups: physical, social and emotional. The composite means for the three groups of health attributes of PTB is 1.70. The social health attribute of PTB among elderly people had the highest mean score of 1.99 while physical and emotion health attributes had mean scores of 1.67 and 1.43 respectively. Thus, if this health attributes are in contrast, physical and social health attributes were sometimes experienced by most elderly people in Lipa City, Batangas, Philippines.

Table 2 reveals the compliance to Directly Observed Therapy (DOT) among elderly people with pulmonary tuberculosis (PTB) in Lipa City, Batangas, Philippines. With regards to how many of them were currently placed on DOT, all the 120 elderly people with pulmonary tuberculosis affirmed that they were currently placed on DOT.

Thus, it can be discovered that the compliance rate was a 100% among the 120 elderly people with PTB. Regarding the drugs taken by the elderly people with PTB, 106(88.3%) acknowledged they were taking ethambutol; 120(100%) were taking rifampin and

isoniazid; 106(88.3%) were taking pyrazinamide while 14(11.7%) were taking streptomycin. Out of the 120 elderly with PTB, 18(15.0%) had been on DOT less than a month, 11(9.0%) had been on it for 1 month, 27(22.5%) had been on it between 2-3 months, 31(25.8%) had been on it between 4-6 months and 29(24.2%) had been on it for more than 6 months. Such findings are possible as the respondents used for this study were found in health care facilities within Lipa City, Batangas, Philippines. This implies that they were consistently watched over and encouraged by the health care workers attending to them to be consistent comply with the DOT they were placed on.

Table 2. Compliance to Directly Observed Therapy among Elderly People with Pulmonary Tuberculosis

Indicators	Frequency	Percentage (%)
1. Are you currently on Directly Observed Therapy (DOT)?		
Yes	120	100.0
2. Drugs taken by elderly with PTB		
Ethambutol (EMB)	106	88.3
Rifampin (RIF)	120	100.0
Isoniazid (INH)	120	100.0
Pyrazinamide (PZA)	106	88.3
Streptomycin	14	11.7
3. Months placed on DOT		
Less than a month	18	15.0
1 month	11	9.0
2-3 months	27	22.5
4-6 months	31	25.8
More than 6 months	29	24.2
No response	4	3.3

Source: Field survey, 2021

The persons who administer the drug to the elderly people with PTB in Lipa City, Batangas, Philippines is presented in Fig. 1 above. Among the 120(100%) elderly people, 22(18.3%) had a family member taking responsibility of administering drugs for PTB to them, 96(80.0%) were responsible for the administering of PTB drugs to themselves and 2(1.7%) had a son taking responsibility of administering drugs for PTB to them. These findings may be influenced by the age of the respondents used for this study. This implies that knowing the elderly are often taken care by both the health care workers in the presence of a family member, it seems that majority of these respondents preferred taking their medications by the hands of their family member or themselves.
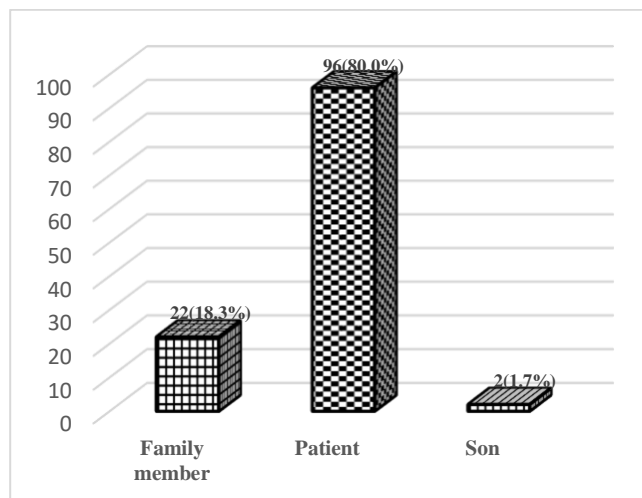

Fig. 1: People who administer drugs to elderly people with pulmonary tuberculosis (PTB) in Lipa City, Batangas, Philippines

Results on the Directly Observed Treatment Short-Course (DOTS) among elderly people with PTB in Lipa City, Batangas, Philippines is presented in Table 3. All of the 120(100%) elderly affirmed that there existed a mutual relationship between them and the health care worker in charge of caring for them. Majority of the elderly with PTB, 62(51.7%) did not experience any side effects from the drug they were administered while on DOTS; 115(95.8%) stated that there was not a time their medication was delayed due to the expiration date of the drug available; 120(100%) acknowledged that their experience of stroke was not a direct consequence of the medications they received while on DOTS and 120(100%) indicated that the health care worker has been effective since they were placed on DOTS.

Table 3. Directly Observed Treatment Short-Course (DOTS) Used Among Elderly with PTB

Indicators	Yes		No	
	f	%	f	%
Is the relationship between me and the health care worker in charge of administering mutual?	120	100.	-	-
Have you experienced any side effects from the drug administered to you while on DOTS?	58	48.30	62	51.70
Was there any time your medication was delayed due to the expiration date of the drug available?	5	4.20	115	95.80
Was your experience of stroke a direct consequence of the medications you receive while on DOTS?	-	-	120	100.00
Has the health care worker been effective since you were placed on DOTS?	120	100	-	

Source: Field survey, 2021

Table 4. Association Between Health Attributes of Pulmonary Tuberculosis Among Elderly and DOTS

		Physical			λ^2_c	p-value	Interpretation
		Never	S	O			
Have you experienced any side effects from the drug administered to you while on DOTS?	Yes	20	30	8	12.129[a]	0.002	
	No	35	27	0			Significant
Was there any time your medication was delayed due to the expiration date of the drug available?	Yes	5	0	0	6.166[a]	0.046	
	No	50	57	8			Significant
Social							
Have you experienced any side effects from the drug administered to you while on DOTS?	Yes	9	41	8	2.675[a]	0.262	
	No	4	47	11			Not Significant
Was there any time your medication was delayed due to the expiration date of the drug available?	Yes	0	5	0	1.897[a]	0.387	
	No	13	83	19			Not Significant
Emotional							
Have you experienced any side effects from the drug administered to you while on DOTS?	Yes	31	19	8	11.632[a]	0.003	
	No	47	15	0			Significant
Was there any time your medication was delayed due to the expiration date of the drug available?	Yes	5	0	0	2.809[a]	0.245	
	No	73	34	8			Not Significant

Legend: Significant at p-value < 0.05

Table 4 presents the association between health attributes among elderly and DOTS. It was observed that there was a significant relationship between the side effects and delay of medication and physical attributes. This was observed since the obtained p-values were less than 0.05. This means that the side effects as well as the delay of medication was affected by the elderly physical attributes. This result of a significant relationship between the side effects and delay of medication and physical attributes is also affirmed by the results found in Table 1.1 were consistent coughing, weakness during exercises, weakness due to reduced potassium level in the body, weight loss and excessive sweating were sometimes experienced by the elderly people with PTB in Lipa City.

The level of recurrence of pulmonary tuberculosis (PTB) among elderly people in Lipa City, Batangas, Philippines is presented in Table 5. When asked about the recurrence of PTB, 65(54.2%) elderly affirmed that they experienced it while 55(45.8%) affirmed that they did not experience it Out of the 65 elderly that experienced recurrence of PTB, 9(7.5%) experienced 1yeaer after receiving treatment while 51(42.5%) acknowledged that they experienced it more than 1year after treatment. Such findings is possible as the respondents used for this study might have ignored

some preventive measures of PTB as well as neglecting their treatment regimen. This could be the basic reason why they were consistently watched over and encouraged by the health care workers attending to them to be consistent comply with the DOT they were placed on.

Table 5. Recurrence of Pulmonary Tuberculosis (PTB) Among the Elderly

Indicators	Frequency	(%)
Have you experience a recurrence of pulmonary tuberculosis?		
Yes	65	54.2
No	55	45.8
Period of recurrence		
1year after treatment	9	7.5
More than 1 year after treatment	51	42.5
No recurrence	60	50.0

Source: Field survey, 2021

CONCLUSION AND RECOMMENDATION

The findings in Table 1.1 are not at par with the findings documented in the study of [18] which revealed incidence of weight loss among 7.3% of 290 patients in the health centre region of Burkina Faso who had severe thinness (BMI < 16.0 kg/m2). It can also be said that the results obtained in this study is in line with that of [19] who obtained results from their research showing a withdrawal of ethambutol in a case due to neuritis of nervus optic among 58 PTB patients who

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experienced severe coughing and fever and were treated with corticosteroids.

The findings in Table 1.2 agrees with the findings document in the study of [14] who stated that social marginalisation is one of the factors that underlie the high and rising rates of pulmonary tuberculosis (PTB) seen among the elderly in low- and middle-income countries. The findings of this study are at par with the findings documented in the study of [10] who documented that social marginalisation in correlation with financial dependency promote the risk of transmission of PTB as it often discourages early health care seeking.

Table 1.3 agrees with the findings documented in the study of [5] which revealed that psychological distress at all levels (mild, moderate and severe) had a significant negative effect on both physical and mental health-related quality of life (HRQL) among PTB patients at primary health care settings in South Africa after 6 months of treatment. The findings of this study are in line with that of [14] who reported that significant deficits in psychological wellbeing exist alongside physical complaints. This is also reported by several other studies.

Findings from this study is in line with that carried out by [14] in Burkina Faso who discovered that 290 PTB patients were placed on DOT for a period of 6 days and other nutritional regimen. Some of these patients were found to be malnourished but found to be better after complying with the DOT they were placed on. It also supports that of the study of [15] who reported that 1210(77%) out of 1577 PTB patients were successfully treated in health care facilities in Chennai, India as a result of consistent compliance with the DOT they were placed on for the period of 60 days.

Results in this study agrees with that found in the study of [5] who reported that elderly PTB patients had experienced nurses giving quality care to elderly patients with PTB in Intensive Care Units of hospitals between 1990 and 2001. It is also in line with that of the study of [8] who reported that a 77% recovery rate among 1577 PTB patients who received quality care and attention from experienced and mature (age-wise) health care practitioners in health care facilities found in Chennai, India.

Therefore, it was concluded that the health attributes of pulmonary tuberculosis (PTB) among elderly people were fever, consistent coughing as well as consistent isolation at home. Compliance to directly observed therapy among the elderly people with PTB was amazingly high. Yet, recurrence of PTB among elderly people in Lipa City was high as more than half of the respondents affirmed that they were currently treating a recurrent case of PTB.

Thus, the following were recommended. Knowing that there was high recurrence of PTB recorded among the respondents, it is key for the management of health care facilities to organize, coordinate and facilitate health education on PTB. Also, comprehensive family education and orientation is suggested for relatives of PTB patients to report early cases of recurrence. As this study is conducted in Lipa City, it is recommended that governments and non-governmental organizations (NGOs) get involved in the fight to curb or eradicate PTB among the populace especially the elderly one. Assistance of elderly people who may be at risk of suffering from PTB as well as face a relapse of it should be given free medical diagnostic services so that incidence of PTB can be appropriately identified and managed.

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