

Awareness of Chronic Obstructive Pulmonary Disease (COPD) Among Smokers in Saudi Arabia: A Cross-Sectional Study

Faisal Khaled H Alhomayani^{1*}, Seham Hassan Almalki², Malak Mohammed Alqahtani³, Abdullah Hassan Almalki⁴

¹Medicine Department, Taif University and Nephrology Center, King Abdulaziz Specialist Hospital

²Collage of Medicine, Taif University

³Collage of Medicine, King Khalid University

⁴Collage of Medicine, Al-Baha University

*Corresponding author: dr.fk505@hotmail.com

Received October 15, 2019; Revised November 27, 2019; Accepted December 10, 2019

Abstract Background: Knowledge about the COPD disease is a strong shield against suffering from, especially those patients who are acquired from environmental, chemical and habitual factors. Worldwide concepts, smokers are really less aware about the consequences. **Objectives:** To assess the awareness and level of knowledge about (COPD) among smokers in Saudi Arabia. **Subjects and methods:** This study was a cross-sectional study carried out in all regions in Saudi Arabia included anyone accepts participation in the questionnaire at any region in Saudi Arabia include Active, Passive and Ex. Smoker. An electronic questionnaire was sent by advanced social contacting to our participants re-analyzed by using SPSS. **Results:** Weak knowledge was seen in the sector of COPD general knowledge, treatment, relationship with smoking and total knowledge while average knowledge about common symptoms of COPD. The mean and standard deviation of total knowledge was 8.9 ± 5.05 . **Conclusion:** This study showed a low level of awareness about the initiation and progression of the disease and even the linkage between two points (smoking, COPD) is not clear for more than 60% of participants.

Keywords: COPD, Chronic Obstructive Polmonary Disease, Smoking, Smoker, Tobacco, Awareness, Saudi Arabia, KSA

Cite This Article: Faisal Khaled H Alhomayani, Seham Hassan Almalki, Malak Mohammed Alqahtani, and Abdullah Hassan Almalki, "Awareness of Chronic Obstructive Pulmonary Disease (COPD) Among Smokers in Saudi Arabia: A Cross-Sectional Study." *American Journal of Medical Sciences and Medicine*, vol. 7, no. 5 (2019): 184-189. doi: 10.12691/ajmsm-7-5-1.

and level of knowledge about (COPD) among smokers in Saudi Arabia.

1. Introduction

Worldwide death registry regards COPD as the 4th leading cause of death [1]. It is nominated to be the 3rd cause in the beginning of 2020 [2]. World health organization recorded that around 2.75 million deaths are due to COPD, which equals 5% of mortalities worldwide [3]. However, 92% of deaths are due to smoking habits. Patients with history of smoking have high incidence to develop COPD in their life [4]. Despite all biological and molecular theories of COPD disease, lack of awareness is the initial ominous step [5]. The disease is very silent and insidious in onset at first and being aggressive at the final stages when 50% of lung function is being lost. People's awareness is crucial to prevent developing or aggravating the disease [6,9]. Therefore, it is very important to make people aware about smoking threats and COPD disease linkage. In the future, one can take preventive steps to stop smoking when studying the COPD-smoking relationship [10]. For this reason, we studied awareness

2. Patients and Methods

This study was a cross-sectional study carried out in all regions in Saudi Arabia included anyone accepts participation in the questionnaire at any region in Saudi Arabia include Active, Passive and Ex-Smoker. Passive smoker: is the inhalation of smoke, called second-hand smoke (SHS), or environmental tobacco smoke (ETS), by persons other than the intended "active" smoker. Active smoker is defined as a person who currently smoked at least one cigarette a day. Ex-smoker is defined as a person who had regularly smoked but who had not smoked in the previous month. The sole exclusion criterion is who refuse to share his data in this research.

2.1. Ethical Approval

This study was approved from regional research center and director of primary health care in the institution. Each

participant gave a verbal consent prior to recruitment and confidentiality was assured for each situation.

2.2. Study Sample Size Calculation and Method of Sampling

Sample size determination was calculated by a sample calculation website by Clinical Research Training at UCSF. We assume we need 9311 according to confidence level 95% and confidence limit 2%.

The electronic questionnaire was provided to WhatsApp, Facebook, Twitter, and other social media access programs and all smokers were invited to fill it. The questionnaire was developed by the researchers based on intensive literature review and experts' consultations to fulfill the criteria. Study questionnaire was online for at least 5 months and all participants were included consecutively till the end date.

2.3. Data Analysis

Data entry and analysis was conducted using statistical software package SPSS version 25.0. Data were presented using descriptive statistics in the form of frequencies and percentages as all data were of categorized type. Analytic statistics was done using Chi Square tests (χ^2) to test for the association and/or the difference between two categorical variables. P-value equal or less than 0.05 was considered statistically significant.

3. Results

3.1. Demographics

The descriptive statistics of our study demographics are plotted in Table 1.

Table 1. Descriptive statistics of demographic distribution

	N	%
Age		
<20	646	9.9
20-30	3072	47.2
30-40	1616	24.8
40-50	823	12.6
50-60	299	4.6
>60	56	.9
Region		
Makkah Al-Mukkaramah	402	6.2
Al-Madinah	228	3.5
Riyadh	985	15.1
Al-Bahah	153	2.3
Jawf	869	13.3
Northern Borders	613	9.4
Eastern Province	865	13.3
Qassim	758	11.6
Tabuk	113	1.7
Jizan	92	1.4
Hail	831	12.8
Najran	416	6.4
Asir	187	2.9
Level of education		
Primary	87	1.3
Secondary	208	3.2
Tertiary	1810	27.8
University and above	4407	67.7

3.2. Smoking History

In Table 2, questions about the smoking history showed that 66% of our participants are Active smokers or Ex-smokers. Ninety-five percent of our participants sit with smoker relatives and/or colleagues. Smoking history was divided into 5,5-10 and more than 10 years. About 40% of our participants smoke for less than 5 years. About 50% of our participants smoke 10-30 cigarettes per day (0.5-1.5 pack/day).

Table 2. Questions about smoking history

	N	%
Are you an Active smoker or an Ex-smoker?		
Yes	4347	66.8
No	2165	33.2
Do you sit with smokers from relatives or colleagues while smoking?		
Yes	6213	95.4
No	299	4.6
If you are an Active or an Ex-smoker, please answer this question: What is the duration of smoking in years?		
<5	1716	39.5
5-10.	1020	23.5
>10	1611	37.1
If you are an Active or an Ex-smoker, please answer this question: How many cigarettes a day?		
<10	1799	41.4
10-30	2159	49.7
>30	389	8.9

3.3. Assessment of Knowledge

In Table 3, there are four sectors of questions about knowledge assessment. Generally speaking, the answers were quietly different with high significance. In the first sector, more than 50% of participants knew about continuous deterioration of COPD, relationship with tobacco smoking and involvement of dust, chemicals and vapors. In the second sectors of questions, assessment of knowledge about the common symptoms revealed that more than 50% of participants knew about common symptoms (chest pain, chronic cough, whistling and fatigue). In the third sector, questioning about the treatment of COPD revealed that most of participants knew about necessity of walking over exercise, stopping exercise in case of acute illness and possibility of deterioration of respiratory function even without superimposed infections. Final sector of questions discussed the relationship of COPD and smoking. Surprisingly, about 70% of patients knew that stop smoking can reduce deterioration in lung function, quitting smoking may reverse lung changes and improving of lung function is done by quitting smoking first.

Weak knowledge was seen in sector of COPD general knowledge, treatment, relationship with smoking and total knowledge while average knowledge about common symptoms of COPD. The mean and standard deviation of total knowledge was 8.9 ± 5.05 as seen Table 4 and Figure 1.

Age, region and number of cigarettes per day were different with statistically significant difference in all four sectors of knowledge. Gender and level of education were found to be statistically significant in knowledge of COPD and treatment. Females were found to be more aware

about COPD than males. University attendees had more knowledge than other subgroups. Being a smoker or ex-smoker was associated with significant knowledge in symptoms and relationship of smoking with COPD. Less

than 5 years duration of smoking was associated with significant knowledge in COPD disease while those with less than 10 years duration were more aware about symptomatology as seen in Table 5.

Table 3. Assessment of knowledge and awareness about symptoms and fate of COPD patient

	DATA						Chi-square	
	No		Don't know		Yes		X ²	P-value
	N	%	N	%	N	%		
The knowledge about Chronic obstructive pulmonary disease.								
Chronic obstructive pulmonary disease is a genetic disease.	1912	29.4%	3213	49.3%	1387	21.3%	814.266	0.000
In COPD, the level of oxygen in the blood is always low.	516	7.9%	2804	43.1%	3192	49.0%	1926.668	0.000
The incidence of COPD is lower in people under 40 years of age.	888	13.6%	3259	50.0%	2365	36.3%	1321.008	0.000
In COPD, there is usually a continuous deterioration over time.	439	6.7%	2621	40.2%	3452	53.0%	2231.243	0.000
More than 80% of cases of COPD are due to tobacco smoking.	516	7.9%	2636	40.5%	3360	51.6%	2012.732	0.000
COPD can be caused by heavy and persistent exposure to dust, chemicals and vapors.	457	7.0%	2652	40.7%	3403	52.3%	2159.236	0.000
A spirometer is used to diagnose chronic obstructive pulmonary disease.	540	8.3%	3376	51.8%	2596	39.9%	1977.646	0.000
The knowledge about Common symptoms of COPD								
Fatigue and tiredness.	385	5.9%	2165	33.2%	3962	60.8%	2947.257	0.000
Wheezing.	699	10.7%	2100	32.2%	3713	57.0%	2095.941	0.000
Swelling of your ankles, feet or legs.	1237	19.0%	3301	50.7%	1974	30.3%	1008.015	0.000
Pain in chest.	583	9.0%	2012	30.9%	3917	60.2%	2577.798	0.000
Fast weight loss.	1020	15.7%	2858	43.9%	2634	40.4%	926.507	0.000
Chronic cough accompanied by phlegm.	490	7.5%	2089	32.1%	3933	60.4%	2735.164	0.000
The knowledge about Treatment								
Exacerbations (episodes of worsening) can occur only with chest infections	901	13.8%	3179	48.8%	2432	37.3%	1242.514	0.000
The patient's health may deteriorate without a respiratory infection.	637	9.8%	2765	42.5%	3110	47.8%	1652.816	0.000
Patients with COPD should stop exercising if they feel shortness of breath.	539	8.3%	2423	37.2%	3550	54.5%	2132.326	0.000
Walking is better than breathing exercises (pulmonary rehabilitation program) to improve physical fitness in people with COPD.	749	11.5%	2646	40.6%	3117	47.9%	1447.769	0.000
The knowledge about the relationship of the disease to smoking								
Women are less vulnerable to the effects of cigarette smoking than men.	1285	19.7%	3533	54.3%	1694	26.0%	1321.054	0.000
Stopping smoking reduces the risk of heart disease.	389	6.0%	1185	18.2%	4938	75.8%	5437.965	0.000
Quitting smoking will reduce the damage to the lung.	365	5.6%	1150	17.7%	4997	76.7%	5662.018	0.000
Stopping smoking usually improves lung function.	422	6.5%	1099	16.9%	4991	76.6%	5602.235	0.000
Nicotine replacement therapy is only available by prescription.	1283	19.7%	2691	41.3%	2538	39.0%	549.892	0.000
Quitting smoking is useless because damage to the lung has occurred.	3213	49.3%	1687	25.9%	1612	24.8%	752.073	0.000

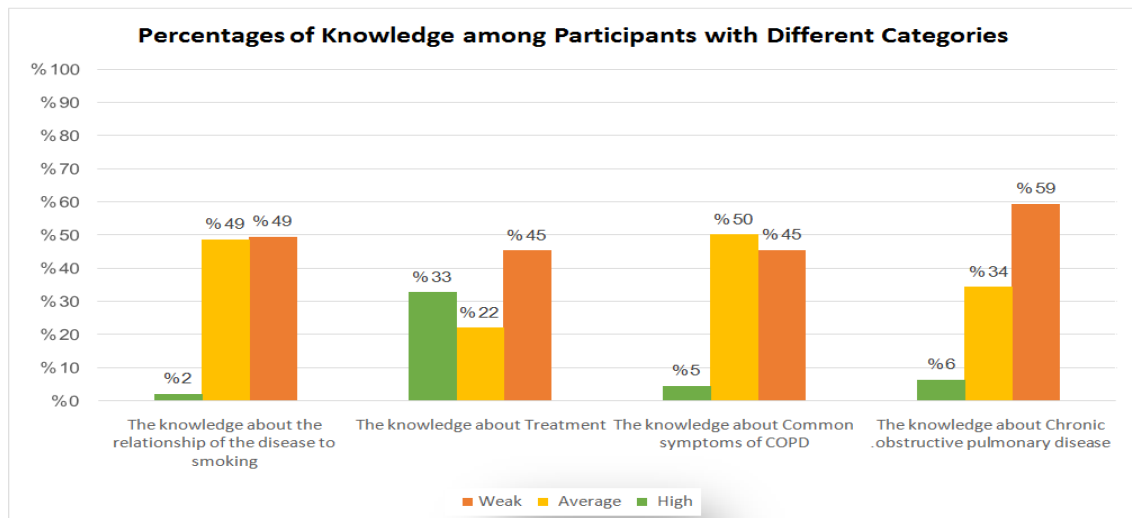


Figure 1. Complex Bar chart of Percentages of knowledge among different categories of COPD management

Table 4. Levels of knowledge and percentages among participants with different categories

	Weak		Average		High		Score	
	N	%	N	%	N	%	Range	Mean±SD
The knowledge about Chronic obstructive pulmonary disease.	3861	59.3	2236	34.3	415	6.4	0-7.	2.7033±2.0419
The knowledge about Common symptoms of COPD	2955	45.4	3265	50.1	292	4.5	0-6.	2.218±1.491
The knowledge about Treatment	2951	45.3	1430	22.0	2131	32.7	0-4.	1.639±1.280
The knowledge about the relationship of the disease to smoking	3216	49.4	3169	48.7	127	2.0	0-6.	2.425±1.297
Total knowledge	4008	61.5	2472	38.0	32	.5	0-20.	8.986±5.056

Table 5. Tabulation of different demographic variables against different types of knowledge

Knowledge	N	Chronic obstructive pulmonary disease.		Common symptoms of COPD		Treatment		The relationship of the disease to smoking		
		Mean±SD	P-value	Mean±SD	P-value	Mean±SD	P-value	Mean±SD	P-value	
Age ^F	<20	646	2.217±1.922	0.000	2.176±1.437	0.000	1.454±1.194	0.000	2.351±1.200	0.000
	20-30	3072	2.892±2.054		2.334±1.492		1.715±1.301		2.538±1.259	
	30-40	1616	2.610±2.011		2.129±1.484		1.574±1.257		2.357±1.287	
	40-50	823	2.527±2.063		2.055±1.517		1.620±1.303		2.267±1.477	
	50-60	299	2.900±2.044		2.107±1.473		1.722±1.272		2.244±1.255	
	>60	56	2.179±1.955		1.964±1.525		1.429±1.204		2.304±1.513	
Gender ^t	Male	4649	2.595±2.092	0.000	2.200±1.538	0.103	1.606±1.321	0.001	2.423±1.329	0.864
	Female	1863	2.975±1.884		2.266±1.364		1.724±1.170		2.429±1.212	
Region ^F	Makkah	402	2.597±2.081	0.000	2.197±1.524	0.000	1.480±1.270	0.000	2.299±1.135	0.000
	Al-Madinah	228	2.575±2.037		2.254±1.527		1.605±1.239		2.404±1.039	
	Riyadh	985	2.885±2.091		2.472±1.537		1.885±1.386		2.726±1.113	
	Al-Bahah	153	2.458±2.074		2.118±1.654		1.294±1.169		2.471±1.089	
	Jawf	869	2.780±1.738		2.386±1.354		1.696±1.152		2.542±1.333	
	Northern borders	613	2.732±1.950		2.401±1.509		1.577±1.257		2.429±1.332	
	Eastern Province	865	1.661±2.108		1.449±1.624		0.931±1.200		1.726±1.365	
	Qassim	758	3.154±2.049		2.446±1.256		2.054±1.224		2.797±1.287	
	Tabuk	113	2.929±2.329		2.212±1.460		1.673±1.385		2.496±1.262	
	Jizan	92	2.815±1.961		2.326±1.520		1.674±1.241		2.413±1.206	
	Hail	831	2.906±2.176		2.156±1.462		1.688±1.326		2.312±1.366	
Level of education ^F	Primary	87	2.517±2.096	0.000	2.138±1.480	0.279	1.552±1.227	0.007	2.299±1.472	0.059
	Secondary	208	2.630±1.842		2.356±1.333		1.712±1.185		2.654±1.198	
	Tertiary	1810	2.515±1.998		2.176±1.463		1.555±1.246		2.420±1.319	
	University and above	4407	2.788±2.063		2.231±1.509		1.673±1.299		2.419±1.287	
Are you an Active or an Ex-smoker? ^t	Yes	4347	2.691±2.057	0.500	2.268±1.499	0.000	1.661±1.287	0.062	2.484±1.307	0.000
	No	2165	2.727±2.012		2.120±1.469		1.598±1.268		2.306±1.267	
Do you sit with smokers from relatives or colleagues while smoking? ^t	Yes	6213	2.693±2.047	0.069	2.220±1.497	0.739	1.637±1.283	0.413	2.427±1.300	0.612
	No	299	2.913±1.937		2.191±1.346		1.699±1.227		2.388±1.219	
If you are an Active or an Ex-smoker, please answer this question: What is the duration of smoking in years? ^F	<5	1716	2.785±2.112	0.002	2.255±1.494	0.002	1.686±1.294	0.409	2.456±1.400	0.085
	5-10.	1020	2.760±2.049		2.405±1.475		1.671±1.269		2.564±1.228	
	>10	1611	2.548±1.994		2.196±1.515		1.628±1.291		2.464±1.251	
If you are an Active or an Ex-smoker, please answer this question: How many cigarettes a day? ^F	<10	1799	2.819±2.104	0.000	2.281±1.513	0.012	1.747±1.340	0.000	2.415±1.380	0.000
	10-30	2159	2.669±2.019		2.296±1.486		1.637±1.244		2.572±1.242	
	>30	389	2.221±1.973		2.054±1.496		1.393±1.228		2.319±1.285	

Table 6. Tabulation of demographic factors against total knowledge

		N	Total knowledge	ANOVA or T-test	
			Mean±SD	test value	P-value
Age	<20	646	8.198±4.426	12.628 ^f	0.000
	20-30	3072	9.479±5.049		
	30-40	1616	8.670±4.980		
	40-50	823	8.469±5.502		
	50-60	299	8.973±4.981		
	>60	56	7.875±5.316		
Gender	Male	4649	8.824±5.211	-4.120 ^t	0.000
	Female	1863	9.394±4.620		
Region	Makkah	402	8.572±4.788	42.873 ^f	0.000
	Medina	228	8.838±4.697		
	Riyadh	985	9.969±5.017		
	Al-Bahah	153	8.340±5.020		
	Jawf	869	9.404±4.387		
	Northern borders	613	9.140±4.812		
	Eastern Province	865	5.766±5.391		
	Qassim	758	10.451±4.854		
	Tabuk	113	9.310±5.497		
	Jizan	92	9.228±4.730		
	Hail	831	9.063±5.530		
	Najran	416	9.849±2.753		
Asir	187	9.369±4.421			
Level of education	Primary	87	8.506±5.115	3.959 ^f	0.008
	Secondary	208	9.351±4.110		
	Tertiary	1810	8.665±4.976		
	University and above	4407	9.111±5.122		
Are you an Active or an Ex-smoker?	Yes	4347	9.104±5.036	2.662 ^t	0.008
	No	2165	8.751±5.087		
Do you sit with smokers from relatives or colleagues while smoking?	Yes	6213	8.977±5.082	-0.714 ^t	0.475
	No	299	9.191±4.465		
If you are an Active or an Ex-smoker, please answer this question: What is the duration of smoking in years?	<5	1716	9.182±5.304	4.251 ^f	0.014
	5-10.	1020	9.399±4.838		
	>10	1611	8.836±4.853		
If you an Active or an Ex-smoker, please answer this question: How many cigarettes a day?	<10	1799	9.262±5.345	10.709 ^f	0.000
	10-30	2159	9.175±4.800		
	>30	389	7.987±4.707		

In Table 6, all the previously mentioned factors were statistically significant different in case of total knowledge. Age (20-30), female gender, those who were from Qassim and Riyadh, secondary school graduates, ex-smokers or current smokers, smoking for less than 10 years and less than 10 cigarettes where more aware about COPD in the form of total knowledge.

4. Discussion

Our study was conducted on various governorates from our kingdom. This is the first publication done in kingdom to done on awareness of COPD in the population of smokers. Simply, Awareness of COPD in population is weak. Weakness in awareness and knowledge was more in male gender. This is going with same results in Zerifin et al and Suthar et al [11,12].

This study mentioned the prevalence of smoking habits in young populations. This can be attributed to several social factors. A study was conducted by Ljaljevi and coworkers suggesting that up to 100,000 young people

start to smoke daily [7]. Most of them are from developing countries.

Certain studies on chemical inhalation due to pollution said that patients were spending hours in polluted spaces with chemicals and dust [10,13]. Prematurity can be attributed to pollution or being in a shared space with a heavy smoker. Our study suggest that, smokers are not aware by their inward and outward hazardous effects as well as progression of COPD [5,8,14].

Smoking have bad impact on the natural course of COPD [15,16]. Despite all these fixed facts, our study population were aware about linkage between smoking and COPD pathophysiology. Male gender and low level of education were the exact prototype of smokers who developed COPD later. This is quite similar to other studies [6,10,17]. This prototype is usually having low level of knowledge about COPD in general and linkage with smoking in particular [5].

In contrast to the nature of progression of the disease and its silent course at the beginning, the results suggest that not even half of the participants aware about it, which means there is a further need for the aware-ness programs

in the population who are in the habit of smoking to increase their awareness level. This may reflect an ominous imagination of being questioning early COPD patients with silent insidious start [10,16].

In a study done by Zielinski & Bednarek et al, most of the COPD cases were in the age group of 40-59 years while our maximum age of smoking prevalence was 20-30 years. As per the study, most of the people who have started smoking in their early twenties, have more chances to develop COPD in their forties. However, as per the findings of our study very few participants are aware about it. Regarding similar studies done by Wali and Ghobian on the prevalence and management of COPD in Saudi Arabia, suggesting that kingdom have the appropriate treatment available for the COPD [18,19]. This important information might be known by the population but as per the finding very less people are aware about the treatment options of our kingdom, and very few aware that COPD cannot be cured completely [3,15].

In conclusion, this study showed low level of awareness about initiation and progression of the disease and even the linkage between two points (smoking, COPD) is not clear for more than 60% of participants.

Acknowledgments

We would like to thank Dr. Dalia El-Sayed Desouky Abdellah for her unlimited support. We appreciate the efforts done by data collectors and study subjects for participation in the study.

Conflict of interest

There is no conflict of interest.

References

- [1] Sansores RH, Velázquez-Uncal M, Pérez-Bautista O, Villalba-Caloca J, Falfán-Valencia R, Ramírez-Venegas A. Prevalence of chronic obstructive pulmonary disease in asymptomatic smokers. *Int J COPD*. 2015;10(1):2357-63.
- [2] Bloom CI, Ricciardi F, Smeeth L, Stone P, Quint JK. Predicting COPD 1-year mortality using prognostic predictors routinely measured in primary care. *BMC Med*. 2019;17(1):1-10.
- [3] Barnes PJ, Celli BR. Systemic manifestations and comorbidities of COPD. *Eur Respir J*. 2009;33(5):1165-85.
- [4] Mun SY, Hwang Y II, Kim JH, Park S, Jang SH, Seo JY, et al. Awareness of chronic obstructive pulmonary disease in current smokers: A nationwide survey. *Korean J Intern Med*. 2015; 30(2): 191-7.
- [5] Zielinski J, Bednarek M, Górecka D, Viegli G, Hurd SS, Fukuchi Y, et al. Increasing COPD awareness. *Eur Respir J*. 2006; 27(4): 833-52.
- [6] Brakema EA, van Gemert FA, van der Kleij RMJJ, Salvi S, Puhan M, Chavannes NH, et al. COPD's early origins in low-and-middle income countries: what are the implications of a false start? *npj Prim Care Respir Med [Internet]*. 2019; 29(1): 2018-20.
- [7] Ljaljević A, Zvrko E, Stojiljković M. Tobacco Use Among Youth: Findings from the Global Youth Tobacco Survey in Montenegro. *Arch Ind Hyg Toxicol [Internet]*. 2008 Jan 1; 59(3).
- [8] Seo JY, Hwang Y II, Mun SY, Kim JH, Kim JH, Park SH, et al. Awareness of COPD in a high risk Korean population. *Yonsei Med J*. 2015; 56(2): 362-7.
- [9] Boopathirajan R, Muthunayanan L. Awareness, Attitude and Use of Tobacco among Medical Students in Chennai. *J Lifestyle Med*. 2017; 7(1): 27-34.
- [10] Xu G, Fan G, Niu W. COPD awareness and treatment in China. Vol. 6, *The Lancet. Respiratory medicine*. England; 2018. p. e38.
- [11] Stav D, Raz M. Prevalence of chronic obstructive pulmonary disease among smokers aged 45 and up in Israel. *Isr Med Assoc J [Internet]*. 2007 Nov; 9(11): 800-2.
- [12] Suthar NN, Patel KL, Shah J, Suthar N. a Study on Awareness of Chronic Obstructive Pulmonary Disease (COPD) Among Smokers. *Ntl J Community Med [Internet]*. 2015; 6(4): 547-53.
- [13] Chapman KR. Increasing Awareness of COPD: Two Steps Forward, One Step Back. *Chronic Obstr Pulm Dis (Miami, Fla)*. 2018 Oct; 5(4): 228-30.
- [14] Pucha N, Barr RG, Han MK, Woodruff PG, Bleecker ER, Kanner RE, et al. Understanding the impact of second-hand smoke exposure on clinical outcomes in participants with COPD in the SPIROMICS cohort. *Thorax*. 2016; 71(5): 411-20.
- [15] Osadnik CR, Singh S. Pulmonary rehabilitation for obstructive lung disease. *Respirology*. 2019; 871-8.
- [16] Uzel FI, Karadag P, Onur ST, Turan D, Yenturk E, Tuncay E. A Basic Question: Are Patients with Chronic Obstructive Pulmonary Disease Aware of Their Disease? *Turkish Thorac J*. 2017 Oct; 18(4): 114-8.
- [17] Ersu R, Bingol Karakoc G, Yildiz F, Kokturk N, Mungan D, Ekinci B, et al. [Evaluation of asthma and COPD awareness in primary care doctors in Turkey]. *Tuberk Toraks*. 2016 Jun; 64(2): 152-62.
- [18] Wali SO, Idrees MM, Alamoudi OS, Aboulfarag AM, Salem AD, Aljohaney AA, et al. Prevalence of chronic obstructive pulmonary disease in Saudi Arabia. *Saudi Med J [Internet]*. 2014 Jul; 35(7): 684-90.
- [19] Al Ghobain M, Alhamad EH, Alorainy HS, Al Kassimi F, Lababidi H, Al-Hajjaj MS. The prevalence of chronic obstructive pulmonary disease in Riyadh, Saudi Arabia: a BOLD study. *Int J Tuberc Lung Dis [Internet]*. 2015 Oct; 19(10): 1252-7.

