

INCIDENCE TREND OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE*Dejan Veljković¹, Zorana Deljanin²*

Chronic Obstructive Pulmonary Disease (COPD) is associated with high morbidity and complications, decreased quality of life, increasing mortality. The objective of the paper was to determine incidence trends of COPD in the population of the Nišava District from 2002 to 2014. The descriptive study was used. Data about new cases of COPD were extracted from the Population Registry of COPD for the population of the Nišava District. Data about population originated from Censuses 2002 and 2011. Crude incidence, age, and gender specific rates were calculated per 100 000 inhabitants. Trend lines were estimated using linear regression. The total number of registered new cases were 7527 (4575 in males and 2952 in females). The average annual new cases was 627 and the annual average crude incidence rate was 164.3/100 000 inhabitants. The lowest annual incidence rate was in 2014 (36.7/100 000) and the highest one was in 2006 (232.6/100 000). Males represent 61 % and females 39 %. Females were significantly older than males (78.5 ± 2.0 vs 81.4 ± 1.8 , $p < 0.001$). Patients older than 50 years of age represent 86% of all registered patients. Incidence rate increased with age. Incidence trend rapidly decreased in 2014 both in males and females; in males: $y = 3.874x + 160.3$, $R^2 = 0.038$, in females: $y = 0.631x + 112.5$, $R^2 = 0.002$. There were 1.6 more new cases of COPD in males than in females but females were older compared with males. COPD wasn't common before the age of 40 and incidence increased with age. Under reporting and under registration of new cases of COPD was observed.

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Key words: *chronical obstructive pulmonary disease, trend, incidence*

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Introduction

The World Health Organization (WHO) has ranked the chronic obstructive pulmonary disease (COPD) as one of the most prevalent long-term conditions worldwide (1). It is assessed that the global burden of COPD will rise, particularly in developing countries, because of the combination of ageing populations and increased smoking rates (2, 3). COPD is a chronic respiratory disease characterized by a decline in lung function over time and accompanied by respiratory symptoms, primarily dyspnea, cough,

and sputum production (4). COPD is associated with a significant economic burden, including hospitalization, work absence, and disability (5).

Chronic obstructive pulmonary disease is a common, preventable, and treatable airflow limitation disease that is usually progressive and associated with enhanced inflammation in the airways and lungs (6). According to the Global Burden Studies (GBDs), COPD causes the death of at least 2.9 million people annually (7). The GBDs highlights that COPD was the sixth leading cause of death in 1990, has been the fourth since 2000 and is projected to be the third by 2020 (8).

It is estimated that about 210 million people have COPD worldwide (4). Overall, the prevalence of COPD in the general population is estimated to be around 1% across all ages, rising steeply to 8–10 % or higher among those aged 40 years or older (9).

The reported prevalence of COPD ranged from 0.2% in Japan to 37% in the USA, but the prevalence of COPD varies widely across countries and populations (10).

There are several well-known risk factors associated with the development and triggering of COPD exacerbations (11, 12). Tobacco smoking, includes many other environmental exposures, such as occupational exposures to dust and fumes in the developed and developing countries (13), and indoor

biomass fuel burning in many developing countries (14).

Factors that may worsen COPD include outdoor pollutants and passive smoke exposure. A number of factors associated with COPD development may not currently be possible to modify; these include the aging lung, sex, comorbidities, and child or adult repeated respiratory infections (15).

The aim

The objective of the paper was to determine the incidence trend of COPD in the population of the Nišava District from 2002 to 2014.

Materials and methods

The descriptive epidemiological study was used. Data about new cases of COPD were extracted

from the Population Registry of COPD for the population of the Nišava District for the period 2002 to 2014. Data about population originated from Censuses 2002 and 2011. Crude incidence and age-specific were calculated per 100.000 inhabitants. Trend lines were estimated using linear regression.

Results

The total number of registered new cases was 7527 (4575 in males and 2952 in females). Males represented 61 % and females 39 %. The male to female incidence ratio was 1.6:1. The average annual number of new COPD cases was 627 and the annual average crude incidence rate was 164.3/100 000. Females were significantly older at the time of diagnosis of COPD than males (78.5 ± 2.0 vs 81.4 ± 1.8 , $p < 0.001$).

Table 1. Number of new COPD cases and crude annual rates of incidence in the period 2002 to 2014

Year	Number of new cases	Crude incidence rates
2002	282	73.9
2003	378	99.0
2004	309	89.9
2005	622	162.9
2006	888	232.6
2007	873	228.9
2008	724	189.6
2009	580	151.9
2010	774	203.0
2011	671	175.8
2012	536	140.4
2013	750	196.5
2014	140	36.7
Total	7527	164.3*

*Annual average incidence rate

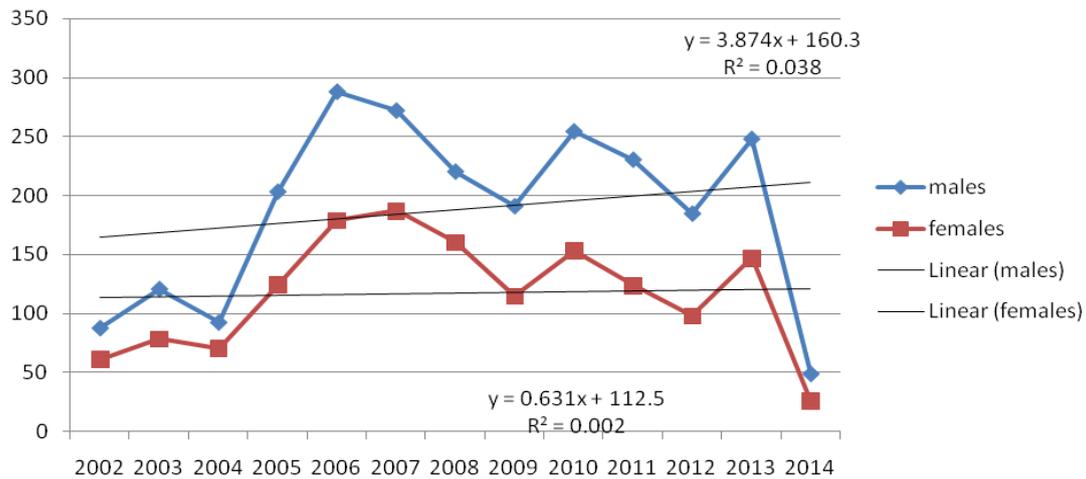


Figure 1. Incidence trend of COPD based on crude incidence rates in males and in females in the period 2002 to 2014

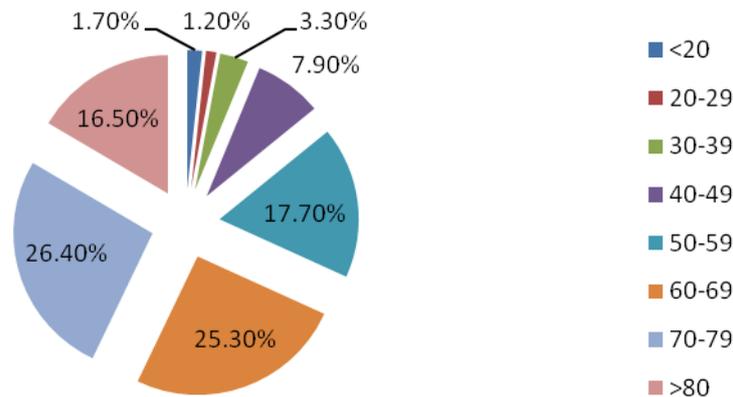


Figure 2. The Age-distribution of new cases of COPD in the period 2002-2014 on the Nišava District

COPD incidence trend, based on crude rapidly decreased both in males and in females.

Value of trend in males: $y = 3.874x + 160.3$, $R^2 = 0.038$

Value of trend in female: $y = 0.631x + 112.5$, $R^2 = 0.002$

The COPD wasn't common before 40 years of age. Patients older than 50 years of age represented 86% of all registered patients with COPD. The most registered new cases were in patients from the age-group 70 to 79 years of age. More than one quarter of registered patients was above 80 years of age.

Discussion

Chronic obstructive pulmonary disease is a common condition, associated with increasing age and smoking exposure. Only 10–15 % of all COPD cases are identified medically (16). For the last decade, an overall increase in COPD prevalence

along with a decrease of incidence was reported in the Nišava District. Over time, all crude incidence rates were higher in males compared to females. In most of the studies, the incidence of COPD was greater in males than in females (16, 17).

The estimated prevalence of COPD is about 1% in the general population and rises sharply in persons aged ≥ 40 years (17). According to the presented results the incidence of COPD was greater in older patients, particularly in those aged 70 years and older. There are similar data in the medical literature (18-20).

The incidence of COPD varies between countries (21). Although COPD incidence has increased over the last 20 years, within the last 10 years, there has been an overall decrease in the USA, Canada (22, 23).

According to findings from Sweden incidence rates were a two- to three-times higher in smokers than non-smokers assessed by GOLD or BTS criteria (24, 25). One study also reported that COPD inci-

dence in former smokers was more than double that in nonsmokers (26).

There is estimated to be more than one billion smokers in the world, which is about a quarter of adults (27). Smoking prevalence is higher in males than in females worldwide. In Serbia in 2006, 33 % of the population, were smokers. There were more males than females who smoked on a daily basis (32.5 % vs 23.7 %), (28). About two-thirds of the population of Serbia (61.7 %) were exposed to tobacco smoke at home and 44.9 % were exposed at work (28).

According to WHO in many developing countries, the consumption of cigarettes is increasing rapidly in both sexes due to population growth and the increased targeted tobacco marketing in these areas (especially at young people) and in Serbia 50.5 % of young people do not have a desirable attitude to smoking (27, 28).

Other causes of airflow obstruction, such as biomass exposure, are not therefore required to ex-

plain any discrepancy between the prevalence of obstruction and the prevalence of smoking.

The rapid decrease of incidence trend of COPD in the Nišava District is the consequence of under reporting of COPD. Reporting of new cases of COPD isn't obligatory in Serbia since 2017 (29).

Conclusion

There were 1.6 more new cases of COPD in males than in females but females were older compared with males. COPD wasn't common before the age of 40 and the incidence increased with age. Under reporting and under registration of COPD was determined in the observed period.

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References

1. World Health Organization (WHO). The world health report 1998 - Life in the 21st century: A vision for all. Geneva: World Health Organization; 1998.
2. Högman M, Sulku J, Stållberg B, Johanes C, Bröms K, Hedenstorm H, et al. Global Initiative for Chronic Obstructive Lung Disease reclassifies half of COPD subjects to lower risk group. *Int J Chron Obstruct Pulmon Dis* 2018; 13:165-73. [[CrossRef](#)] [[PubMed](#)]
3. Simpson CR, Hippisley-Cox J, Sheikh A. Trends in the epidemiology of chronic obstructive pulmonary disease in England: a national study of 51 804 patients. *Br J Gen Pract* 2010; 60(576):277-84. [[CrossRef](#)] [[PubMed](#)]
4. Global Strategy for the diagnosis, management, and prevention of chronic obstructive lung disease (updated 2014). Global Initiative for Chronic Obstructive Lung Disease (GOLD); 2014.
5. World Health Organization (WHO). European health for all database (HFA-DB). "cited 2019 Feb 21"; Available from: <https://gateway.euro.who.int/en/datasets/european-health-for-all-database/>
6. Rennard SI, Drummond MB. Early chronic obstructive pulmonary disease: definition, assessment, and prevention. *Lancet* 2015; 385(9979):1778-88. [[CrossRef](#)] [[PubMed](#)]
7. World Health Organization (WHO). European mortality database (MDB). "cited 2019 Feb 21"; Available from: <https://gateway.euro.who.int/en/datasets/european-mortality-database/>
8. Murray CJ, Lopez AD. Alternative projections of mortality and disability by cause 1990–2020: Global Burden of Disease Study. *Lancet* 1997; 349(9064): 1498-504. [[CrossRef](#)] [[PubMed](#)]
9. Porter RS, Kaplan JL. The Merck manual of diagnosis and therapy. New Jersey: Merck Sharp & Dohme Corp.; 2011.
10. Rycroft EC, Heyes A, Lanza L, Becker K. Epidemiology of chronic obstructive pulmonary disease: a literature review. *Int J Chron Obstruct Pulmon Dis* 2012; 7:457-94. [[CrossRef](#)] [[PubMed](#)]
11. Barnes PJ. Chronic Obstructive pulmonary Disease: effect beyond the lungs. *Plos Med* 2010; 7 (3): e1000220. [[CrossRef](#)] [[PubMed](#)]
12. National Clinical Guideline Centre. Chronic obstructive pulmonary disease. Management of chronic obstructive pulmonary disease in adults in primary and secondary care. London: Royal College of Physicians; 2010. [[PubMed](#)]
13. Mannino DM, Buist AS. Global burden of COPD: risk factors, prevalence, and future trends. *Lancet* 2007; 370(9589):765-73. [[CrossRef](#)] [[PubMed](#)]
14. Hooper R, Burney P, Vollmer WM, McBurnie MA, Gislason T, Tan WC, et al. Risk factors for COPD spirometrically defined from the lower limit of normal in the BOLD project. *Eur Respir J* 2012; 39(6):1343-53. [[CrossRef](#)] [[PubMed](#)]
15. Ford SE. Trends in mortality from chronic obstructive pulmonary disease among adults in the United States. *Chest* 2015; 148(4):962-70. [[CrossRef](#)] [[PubMed](#)]

16. Soriano BJ. An epidemiological overview of chronic obstructive pulmonary disease: what can real-life data tell us about disease management? *COPD* 2017; 14 (Suppl 1):S3-S7 [[Crossref](#)] [[PubMed](#)]
17. Doucet M, Rochette L, Hame D. Incidence, prevalence, and mortality trends in chronic obstructive pulmonary disease over 2001 to 2011: a public health point of view of the burden. *Can Respir J* 2016; 2016: 7518287. [[Crossref](#)] [[PubMed](#)]
18. Vestbo J, Hurd SS, Agusti AG, Jones PW, Vogelmeier C, Anzueto A, et al. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease: GOLD executive summary. *Am J Respir Crit Care Med* 2013; 187(4):347-65. [[Crossref](#)] [[PubMed](#)]
19. World Health Organization (WHO). Global surveillance, prevention and control of chronic respiratory diseases. A comprehensive approach. Geneva: World Health Organization; 2007.
20. García Rodríguez LA, Wallander MA, Tolosa LB, Johansson S. Chronic obstructive pulmonary disease in UK primary care: incidence and risk factors. *COPD* 2009; 6(5):369-79. [[Crossref](#)] [[PubMed](#)]
21. Cerveri I, Accordini S, Verlato G, Corsico A, Zoia MC, Casali L, et al. Variations in the prevalence across countries of chronic bronchitis and smoking habits in young adults. *Eur Respir J* 2001; 18(1):85-92. [[Crossref](#)] [[PubMed](#)]
22. Lindgren B. Trends in obstructive lung disease in hospital registers in Sweden 1987–1996. *Eur Respir Rev* 2000; 10(75):423.
23. Lipton R, Banerjee A. The geography of chronic obstructive pulmonary disease across time: California in 1993 and 1999. *Int J Med Sci* 2007; 4(4):179-89. [[Crossref](#)] [[PubMed](#)]
24. Kabir Z, Connolly GN, Koh HK, Clancy L. Chronic obstructive pulmonary disease hospitalization rates in Massachusetts: a trend analysis. *QJM* 2010; 103(3): 163-8. [[Crossref](#)] [[PubMed](#)]
25. Lindberg A, Eriksson B, Larsson LG, Rönmark E, Sandstrom T, Lundbäck B. Seven-year cumulative incidence of COPD in an age-stratified general population sample. *Chest* 2006; 129(4):879-85. [[Crossref](#)] [[PubMed](#)]
26. Gershon AS, Wang C, Wilton AS, Raut R, To T. Trends in chronic obstructive pulmonary disease prevalence, incidence, and mortality in Ontario, Canada, 1996 to 2007: a population-based study. *Arch Intern Med* 2010; 170(6):560-5. [[Crossref](#)] [[PubMed](#)]
27. Kocic B, Petrovic B, Rancic N, Ilic M. Lung cancer trends in southeastern Serbia. *Cent Eur J Public Health* 2013; 21(1):17-21. [[Crossref](#)] [[PubMed](#)]
28. National Health Survey, Serbia, 2006. Key Findings. Belgrade: Ministry of Health of the Republic of Serbia; 2007.
29. Zakon o zdravstvenoj dokumentaciji i evidencijama u oblasti zdravstva. Službeni glasnik RS br. 123/2014 i 106/2015. "cited 2019 Feb 21"; Available from: <http://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/skupstina/zakon/2014/123/2/reg>

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doi:10.5633/amm.2019.0203**TREND INCIDENCIJE HRONIČNE OPSTRUKTIVNE BOLESTI PLUĆA***Dejan Veljković¹, Zorana Deljanin²*¹Odsjek za sanitetsko obezbeđenje, Odred žandarmerije, Kraljevo, Srbija²Institut za javno zdravlje Niš, Niš, Srbija

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Hroničnu opstruktivnu bolest pluća (HOBP) karakterišu visok morbiditet, česte komplikacije, visok mortalitet, snižen kvalitet života i veliki ekonomski troškovi. Rad je imao za cilj da prikaže trend incidencije HOBP-a na teritoriji Nišavskog okruga u periodu 2002–2014. Podaci o novoobolelima dobijeni su iz populacionog registra za HOBP i retrospektivno su analizirani za populaciju Nišavskog okruga. Izračunate su sirove stope, specifične stope prema polu i uzrastu na 100 000 stanovnika. Podaci o populaciji dobijeni su iz popisa iz 2002. i 2011. godine. Izračunat je linearni trend. U posmatranom 12-godišnjem periodu registrovano je 7527 novoobolelih (4575 muškaraca i 2952 žene). Prosečan godišnji broj novoobolelih iznosio je 627, a prosečna godišnja stopa incidencije bila je 164,3/100 000. Godišnje stope incidencije kretale su se od 36,7/100 000 (2014) do 232,6/100 000 (2006). Bilo je značajno više novoobolelih muškaraca nego žena (61 % prema 39 %). Žene su bile značajno starije od muškaraca ($78,5 \pm 2,0$ prema $81,4 \pm 1,8$; $p < 0,001$). Stope incidencije povećavale su se sa starenjem, a stariji od 50 godina činili su 86 % svih novoobolelih. Trend incidencije i kod muškaraca i kod žena naglo je pao 2014, kod muškaraca: $y = 3,874x + 160,3$; $R^2 = 0,038$; a kod žena: $y = 0,631x + 112,5$; $R^2 = 0,002$. Muškarci su obolevali 1,6 puta više od žena, ali su žene bile starije u vreme postavljanja dijagnoze HOBP-a. Neredovno prijavljivanje imalo je za posledicu podregistraciju novoobolelih od HOBP-a u posmatranom periodu.

*Acta Medica Medianae 2019;58(2):16-21.***Ključne reči:** trend, incidencija, hronična opstruktivna bolest pluća