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Worldwide burden of COPD in high- and low-income countries. Part II. Burden of chronic obstructive lung disease in Latin America: the PLATINO study

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SETTING: Five Latin American cities: São Paulo, Brazil; Mexico City, Mexico; Montevideo, Uruguay; Santiago, Chile; Caracas, Venezuela.

OBJECTIVE: To describe the burden of chronic obstructive pulmonary disease (COPD) in Latin America.

DESIGN: This is a multicentre study. Post-bronchodilator spirometry was used and the main outcome measure was $FEV_1/FVC < 0.7$ (fixed ratio criterion). Global Obstructive Lung Disease (GOLD) stages were also analysed.

RESULTS: The combined population aged ≥40 years in the five countries included in the study was approximately 85.3 million. Of these, it was estimated that 12.2 million have airflow obstruction, which corresponds to our prevalence estimate of 14.3%. The proportion of subjects in Stages II–IV of the GOLD classification was 5.6%. Risk factors presenting the highest aetiological fractions for COPD were age, current smoking, indoor exposure to coal and exposure to dust in the workplace. Smoking, the modifiable factor with the strongest aetiological fraction for COPD, affects 29.2% of adults aged ≥40 years in these cities, corresponding to approximately 25 million smokers in this age group.

CONCLUSION: Prevention of smoking and exposure to pollutants, such as coal and dust, are the interventions most likely to succeed against COPD in Latin America. The information obtained by a collaborative study has been vast and encouraging for other similar studies.

KEY WORDS: COPD; spirometry; Latin America; smoking; respiratory function tests

AN ANALYSIS of the global burden of disease concluded that chronic obstructive pulmonary disease (COPD) is the sixth major cause of death and disability in low- and middle-income countries at the beginning of the twenty-first century.[1] The situation is particularly challenging in the Latin American context. This region is undergoing very rapid epidemiological and demographic transition, and there is a rise in chronic diseases as a result of the aging of the population. The

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Latin American scenario is also of concern given the high rates of tobacco consumption—the main risk factor for COPD in the region.[2]

The present study uses data from the Proyecto Latinoamericano de Investigación en Obstrucción Pulmonar, the PLATINO study,[3,4] to describe the burden of COPD in five Latin American sites.

METHODS

The detailed methodology of the PLATINO study has been published elsewhere.[3] Briefly, five cities in Latin America were selected and representative samples of the adult population in each city were sampled. The cities included in the study were São Paulo, Brazil; Mexico City, Mexico; Montevideo, Uruguay; Santiago, Chile; and Caracas, Venezuela. Comparable multistage sampling strategies were used across sites. Sample size calculations required approximately 800 subjects per site. A standardised questionnaire was used, and pre- and post-bronchodilator spirometry was performed. Details of the procedures used in the spirometric evaluation are also available elsewhere.[5] The main outcome variable in this project was the fixed ratio criterion for COPD: forced expiratory volume in the first second (FEV_1)/forced vital capacity (FVC) < 0.7 post-bronchodilator.[6] The Global Obstructive Lung Disease (GOLD) stages were analysed to evaluate COPD severity.[7]

Ethical approval was obtained from local ethics committees and confidentiality was ensured.

RESULTS

The prevalence of COPD ranged from 5.6% in Mexican females to 27.2% in Uruguayan males (Figure 1). In all countries, males were more likely than females to present with COPD. The lowest prevalence of COPD was found in Mexico. One hypothesis for this difference was altitude above sea level.[4] However, the
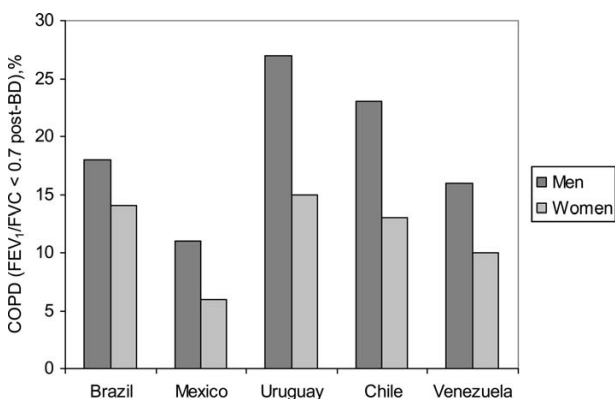
Figure 1   Prevalence of COPD in five Latin American cities by sex—the PLATINO study. COPD = chronic obstructive pulmonary disease; FEV_1 = forced expiratory volume in 1 second; FVC = forced vital capacity; BD = bronchodilator.
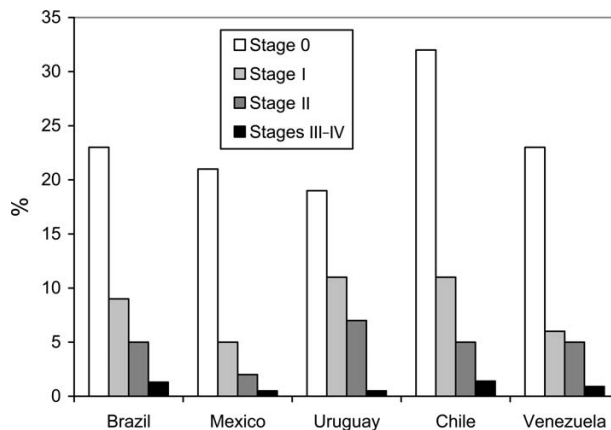
Figure 2   Stages of COPD according to the GOLD classification —the PLATINO study. COPD = chronic obstructive pulmonary disease; GOLD = Global Obstructive Lung Disease.

population of Mexico City differs from the other cities in more than altitude, and particularly ethnic composition. It is possible that genetics plays a role in the low determination of COPD in Mexicans. Figure 2 presents COPD estimates using the stages of severity proposed by the GOLD classification. Stage IV affected $<0.5\%$ of the subjects at each site, and was therefore combined with Stage III for descriptive purposes. The proportion of subjects with respiratory symptoms but without airflow obstruction (previously known as GOLD stage 0) ranged from 19% in Uruguay to 32% in Chile.

In Brazil, the largest country in Latin America, of just over 45 million adults aged $\geqslant$40 years,* an estimated 7 million (15.8%) had COPD. Medical diagnosis of the disease was extremely rare (only 2.0%). Just over 18% of the COPD cases reported taking medication for respiratory problems, and 11% reported having undergone spirometric testing. In Brazil, the prevalence of smoking in subjects aged $\geqslant$40 years was 23.9%, which represents almost 11 million smokers in this age group. Even among severe COPD cases (Stages III and IV), only 15% had a medical diagnosis of COPD and only half were using medication.

In Mexico, of 26.5 million residents aged $\geqslant$40 years,† 7.8% suffered from COPD according to the PLATINO data. This figure represents over 2 million subjects in this age group. Of these, only 5% had a medical diagnosis of the disease, 14% were taking medication for respiratory problems and 13% had undergone spirometric testing. The prevalence of smoking in subjects aged $\geqslant$40 years was 25.4%, representing over 6.5 million smokers in this age group. Among severe COPD cases (Stages III and IV of the GOLD classification), only 0.8% had a medical diagnosis of COPD and 5.1% were on medication.

In Uruguay, of 1.3 million inhabitants aged ⩾40 years,* an estimated 250 000 had COPD, but only about 5000 were clinically diagnosed with COPD. Of the COPD cases, approximately 21% were taking medication for respiratory problems and 24% had undergone spirometric testing. Of the 1.3 million subjects aged ⩾40 years, approximately 365 000 were current smokers. Among subjects in Stages III and IV of the GOLD classification, 20% had a medical diagnosis.

In Chile, the population aged ⩾40 years is 5 million.† Of these, 16.9% (840 000 subjects) suffered from COPD according to the PLATINO data, although only 3% had a medical diagnosis of the disease. The other figures are the highest in the study: 36% reported taking medication for respiratory problems and 29% reported having undergone spirometric testing. Conversely, the highest prevalence of smoking was observed in Chile (35.9%, representing 2 million subjects). Of the 51 extreme COPD cases, only five had a medical diagnosis and 20 were on medication for respiratory problems.

The Venezuelan scenario is not very different from that observed in the other countries. Of the 7.5 million subjects aged ⩾40 years,[8] 12.1% (approximately 1 million) were suffering from COPD and 28.5% (just over 2 million) were smokers. Of the approximately 1 million COPD cases, only 17 000 had a medical diagnosis of the disease, 25.5% reported taking medication for respiratory problems and 17.8% had undergone spirometric testing. Among the extreme COPD cases (Stages III and IV of the GOLD classification), 8.3% had a medical diagnosis and 83.3% were on medication.

In the pooled dataset, we explored attributable risk for COPD according to selected exposures, which were included in logistic regression models. Age >60 years presented an attributable risk for COPD of 52% according to both the fixed ratio and the GOLD II-IV criteria. In terms of modifiable risk factors, current smoking presented the highest attributable risk; 27% for COPD according to the fixed ratio criterion and 31% according to the GOLD II-IV criteria. Exposure to coal for ⩾10 years was responsible for 11% of the COPD cases according to the fixed ratio criterion and 13% according to the GOLD II-IV criteria. Exposure to dust in the workplace for ⩾10 years ranked fourth in terms of attributable risk; 9% for the fixed ratio and 11% for the GOLD II-IV criteria. All other factors—male sex, low schooling, exposure to biomass, history of tuberculosis, low body mass index and childhood admission due to respiratory problems—

presented attributable risks of below 10% for both sets of criteria. It should be noted that as age is not a modifiable factor, prevention of smoking is the strongest possible intervention against COPD based on the PLATINO data.

DISCUSSION

Our estimates are based on data from a multicentre study with several methodological strengths.[3] Refusal rates were relatively low and, more importantly, respondents were not different from non-respondents in terms of smoking status. Random sampling strategies also helped minimise selection bias. The utilisation of post-bronchodilator spirometry in a household survey must also be highlighted, and it is important to keep in mind that the quality of the spirometries was shown to be excellent.

The main limitation of the analyses presented here is that our burden estimates assume that the prevalence figures found in the capitals of each country (Mexico City, Montevideo, Santiago, Caracas) and in the largest city in Brazil (São Paulo) are valid for the entire country. In fact, it is likely that our figures are overestimations in terms of medical diagnosis, spirometry performance and medication intake.[9,10] This means that the real burden of COPD underdiagnosis and lack of adequate treatment is worse than that described here. In terms of the prevalence of COPD, it is not possible to know whether or not the estimates we have from each big urban city are valid for the entire country. For example, subjects living in rural areas can be exposed to other risk factors, such as indoor biomass, which are not common in urban areas.

The combined prevalence of COPD in these five Latin American countries was 14.3%, 18.9% in males and 11.3% in females. In the Burden of Obstructive Lung Disease (BOLD) project,[10] which used a similar methodology and included 12 countries, the combined prevalence of COPD was 10.1% overall, 11.8% in males and 8.5% in females. A survey in five Colombian cities found a COPD prevalence ranging from 6.2% to 13.5%.[11] These findings suggest that the burden of COPD in Latin America is high, and that prevention of the disease is an urgent public health priority. Concomitant prevention of smoking seems essential to minimise the burden of COPD in Latin America. Investments should also be made in terms of diagnosis and treatment of COPD, because the prevalence of misdiagnosis and inadequate treatment was uniformly high in the cities studied.

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† http://www.ine.gov.ve/poblacion/salidadistribucion.asp?Tt=Cuadro 250&cuadro=cuadro250

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RÉSUMÉ

CONTEXTE : Cinq villes d'Amérique Latine : São Paulo, Brésil ; Mexico City, Mexique ; Montevideo, Uruguay ; Santiago, Chili ; Caracas, Venezuela.

OBJECTIF : Décrire le fardeau de la bronchopneumopathie chronique obstructive (BPCO) en Amérique Latine.

SCHÉMA : Etude multicentrique. On a utilisé la spirométrie après bronchodilatation et la mesure principale de résultat a été un rapport $FEV_1/FVC < 0,7$ (critère de ratio fixe). On a analysé également les stades GOLD.

RÉSULTATS : La population âgée de $\geqslant 40$ ans combinée des cinq pays inclus a atteint approximativement 85,3 millions. Parmi ceux-ci, on estime que 12,2 millions souffrent d'obstruction des débits aériens, ce qui correspond à notre estimation de prévalence de 14,3%. La proportion des sujets atteignant les Stades II-IV de la classification GOLD a été de 5,6%. Les facteurs de risque intervenant pour la plus grande fraction dans l'étiologie de la BPCO ont été l'âge, le fait de fumer actuellement, et l'exposition à de la poussière de charbon à domicile et à de la poussière au travail. Le tabagisme, qui est le facteur évitable représentant la plus forte fraction étiologique de la BPCO, concerne 29,2% des adultes âgés de $\geqslant 40$ ans dans ces pays, ce qui représente environ 25 millions de fumeurs dans ce groupe d'âge.

CONCLUSION : La prévention du tabagisme et de l'exposition aux polluants tels que le charbon ou la poussière sont les interventions les plus susceptibles de réussir dans la lutte contre la BPCO en Amérique Latine. L'information obtenue dans cette étude en collaboration a été importante et permet d'encourager d'autres études similaires.

RESUMEN

MARCA DE REFERENCIA : Participaron en el estudio cinco ciudades de América Latina : San Pablo, Brasil ; Ciudad de México, México ; Montevideo, Uruguay ; Santiago de Chile, Chile ; Caracas, Venezuela.

OBJETIVO : Describir el impacto de la enfermedad pulmonar obstructiva crónica (EPOC) en América Latina.

DISEÑO : Estudio multicéntrico. Se realizó espirometría post-broncodilatador siendo el principal parámetro diagnóstico utilizado la relación $FEV1/FVC < 0,7$ (criterio relación fija). Los estadios GOLD también fueron analizados.

RESULTADOS : La población de los cinco países estudiados que representa al grupo de $\geqslant 40$ años incluyen aproximadamente 85,3 millones. De ellos, se estima que 12,2 millones, de acuerdo a nuestros datos de prevalencia (14,3%), tienen obstrucción al flujo aéreo. La proporción de sujetos en Estadios II-IV de la clasificación GOLD fue 5,6%. Los factores de riesgo con mayores fracciones etiológicas fueron edad, tabaquismo actual, exposición domiciliaria a humos y laborales de polvos. El tabaquismo, dentro de los factores modificables, fue la fracción etiológica mas fuerte para EPOC, y afecta a 29,2% de los adultos de $\geqslant 40$ años en estas ciudades, y aproximadamente 25 millones de fumadores, del mismo rango etáreo, de estos países.

CONCLUSIONES : Prevenir el tabaquismo y otras exposiciones tales como humos y polvos, son las intervenciones con mas probabilidad de éxito contra la EPOC en América Latina. Esta información proveniente de un estudio en colaboración de cinco centros ha sido vasta y consistente con otros estudios similares.