

# Metabolic syndrome in the prison population: New lines of intervention

Patricia Romero-Marco<sup>1</sup>, Fahd Beddar Chaib<sup>2</sup>, Ana María Fernández-Araque<sup>1</sup>

<sup>1</sup>Department of Nursing, University of Valladolid, Soria Campus.

<sup>2</sup>University Hospital of Santa Bárbara. Soria.

---

Text received: 22/02/2024

Text accepted: 08/04/2024

Metabolic Syndrome (MetS) is a constellation of risk factors that includes abdominal obesity, high triglyceride levels, low HDL cholesterol (HDL-C), elevated blood pressure, and high fasting glucose levels. MetS is associated with chronic diseases such as accelerated atherosclerotic cardiovascular disease, hyperuricemia/gout, chronic kidney disease, and obstructive sleep apnea<sup>1</sup>.

The diagnosis of MetS varies according to the criteria applied and the total number of risk factors considered by different institutions. Therefore the prevalence of MetS may differ. With this in mind, data from the National Health and Nutrition Examination Survey (NHANES) estimated that 35% of adults in the United States and up to 50% of the population over 60 years old have a diagnosis of MetS. In addition, the Metabolic Syndrome and Arteries Research (MARE) study, which applies the ATP III criteria, established a MetS prevalence of 23.9% in men and 24.6% in women in Europe<sup>2</sup>. In Spain, according to WHO criteria, the prevalence of MetS is 32% in men and 29% in women. Furthermore, the COVID-19 pandemic lockdown has increased the global prevalence of MetS and its risk factors due to changes in dietary and physical activity habits and the use of antipsychotics.

An increase in non-communicable chronic pathologies, specifically in metabolic syndrome risk factors, has been observed amongst the prison population in recent years, especially in high-income countries. However, studies on this topic are very scarce<sup>3</sup> and/or provide partial information showing

when they show the prevalence of cardiovascular risk factors or related situations and conditions that incarcerated individuals experience to a greater extent than the general population, such as the prevalence of metabolic syndrome observed in the prison population with mental illness and substance use disorders, infectious diseases including HIV, tuberculosis, and hepatitis, non-communicable diseases such as obesity, diabetes, hypertension, etc., and cognitive disability such as stress and post-traumatic stress disorder<sup>4-6</sup>.

In the case of women, the scarcity of data and studies exacerbates the situation<sup>7</sup>.

The main reasons for the increased prevalence of metabolic syndrome in this population are the same as the ones that were published in 2016<sup>8</sup>, and include progressive aging, low socioeconomic status of much of the incarcerated population from low-income countries, higher global morbidity load among inmates, frequent smoking habits amongst inmates in Spain where 3 out of 4 smoke, and the widespread use of second-generation antipsychotics, which are associated with weight gain and the risk of dyslipidaemia or diabetes mellitus.

Numerous studies in the literature show that the primary therapeutic strategy for the prevention, treatment, and management of metabolic syndrome and its risk factors are nutritional and dietary interventions, exercise, reduced tobacco and alcohol consumption, and overall modifications to establish a healthy lifestyle<sup>5</sup>. Most studies conducted in correctional facilities report improvements in metabolic syndrome following dietary and exercise

interventions or combined approaches. However efforts to prevent smoking seem to have had less successful results, especially among women and young people<sup>4</sup>.

The main lifestyle strategies and interventions observed relate to caloric and simple carbohydrate restriction, lipid modification, and exercise and physical activity activation programs.

A novel area for exploration is related to the role and importance of intestinal microbiota in human health, which is currently better understood. Recent studies<sup>9,10</sup> have reported a strong impact by antipsychotics on the composition of intestinal microbiota, which may impact adiposity. Experimental models suggest that treatment with prebiotics may be effective in limiting weight gain following antipsychotic treatment.

The health of the prison population is also a public health issue, as the global prison population has increased by 24% since 2000, with over 10.77 million people detained worldwide in 2021<sup>11</sup>.

At the latest WHO international meeting in Lisbon in 2017 on prisons and health, the importance of recognizing “the role of prisons as important settings to address health inequalities and to recognize the status of people in prison as a disadvantaged group in terms of health and well-being” was emphasized. Providing healthcare to inmates is an international policy norm that includes health restoration and disease prevention<sup>12</sup>.

Healthcare in the prison setting is a crucial component of public health, and proper management of healthcare in prisons is essential to reduce health inequalities amongst the population. However, there is very little published evidence on current governance systems in prison healthcare or on the impact of different intervention policies on health outcomes<sup>11</sup>.

The study of health, incidence, and prevalence of non-communicable diseases, particularly metabolic syndrome, and the exploration of lifestyle strategies and interventions in this population are necessary due to the scarcity of evidence and the special circumstances they present.

## CORRESPONDENCE

Patricia Romero-Marco  
E-mail: patricia.romero@uva.es

## BIBLIOGRAPHY

1. Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. Executive Summary of The Third Report of The National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, And Treatment of High Blood Cholesterol In Adults (Adult Treatment Panel III). *JAMA*. 2001;285(19):2486-97.
2. Scuteri A, Cunha PG, Rosei EA, Badariere J, Bekaert S, Cockcroft JR, *et al*. Arterial stiffness and influences of the metabolic syndrome: A cross-countries study. *Atherosclerosis*. 2014;233(2):654-60.
3. Marco Mouriño A, Rivera-Esteban J, Augustin S, Turu Santigosa E, Pericàs JM. Metabolic morbidity in the prison population of Catalonia, Spain. *Aten Primaria*. 2023;55(6):102620.
4. Ferns G. Cause, consequence or coincidence: The relationship between psychiatric disease and metabolic syndrome. *Transl Metab Syndr Res*. 2018;1:23-38. <https://doi.org/10.1016/j.tmsr.2018.04.003>
5. McLeod KE, Martin RE, Butler A, Young JT, Southalan L, Borschmann R, *et al*. Global prison health care governance and health equity: A critical lack of evidence. *Am J Public Health*. 2020;110(3):303-8.
6. Serra RM, Ribeiro LC, Ferreira JBB, Dos Santos LL. Prevalence of chronic noncommunicable diseases in the prison system: a public health challenge. *Cienc e Saude Coletiva*. 2022;27(12):4475-84.
7. Rivera Esteban JM, Augustin S. Metabolic comorbidity, the new enemy. *Metabolic syndrome and steatohepatitis*. *Rev Esp Sanid Penit*. 2020;22(2):55-7.
8. Vera Remartínez EJ. Nuevos tiempos para la Sanidad Penitenciaria: los condicionantes de la edad y del síndrome metabólico. 2016;73-5.
9. Xu Y, Shao M, Fang X, Tang W, Zhou C, Hu X, *et al*. Antipsychotic-induced gastrointestinal hypomotility and the alteration in gut microbiota in patients with schizophrenia. *Brain Behav Immun*. 2022;99:119-29. <https://doi.org/10.1016/j.bbi.2021.09.014>
10. Zeng CR, Yang P, Cao T, Gu YX, Li NN, Zhang BK, *et al*. Gut microbiota: An intermediary between metabolic syndrome and cognitive deficits in schizophrenia. *Prog Neuro-Psychopharmacology Biol Psychiatry*. 2021;106:110097. <https://doi.org/10.1016/j.pnpbp.2020.110097>

11. Verde L, Pagano AM, De Leo M, Vetrani C, Ambretti A, Lucania L, *et al.* Diet-Related Risk Factors for Chronic Noncommunicable Diseases in Italian Prisoners: B.A.C.I. (Benessere All'interno delle Carceri Italiane, Well-Being Inside the Italian Prisons) Project by the Italian Society of Penitentiary Medicine and Public Health (S.I.M.S.Pe. Società Italiana di Medicina e Sanità Penitenziaria). *Curr Nutr Rep.* 2023;12(4):709-20. <https://doi.org/10.1007/s13668-023-00502-y>
12. WHO Regional Office for Europe. Conclusions of the WHO international meeting on prisons and health Lisbon 2017. [Internet]. WHO. 2018. pp. 4. Disponible en: <https://iris.who.int/bitstream/handle/10665/345712/WHO-EURO-2018-3321-43080-60296-eng.pdf?sequence=3>