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## **Impact of COVID-19 lockdown on lifestyle adherence in stay-at-home patients with chronic coronary syndromes: towards a time bomb.**

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**Conflicts of interest**

None

**Keywords**

COVID-19; lockdown; chronic coronary syndromes; lifestyle; adherence

## **Introduction**

With lockdown policies implemented all over the world, a major emerging problem concerns the potential deleterious coronavirus disease 2019 (COVID-19)-related consequences in patients with chronic diseases. Long-term management of patients with chronic coronary syndromes (CCS) is based on 1/ lifestyle and risk factors control and 2/ pharmacological management (1), which are major determinants of long-term prognosis.

The lockdown resulting from the COVID-19 pandemic has created a psychological and physical situation that jeopardizes adherence to CCS management. This unprecedented situation offers a unique opportunity to evaluate health behaviors in stay-at-home CCS patients. Moreover, there have been alarming media messages on the potential harmful relationship between drugs like angiotensin-converting enzyme inhibitors (ACEIs) or angiotensin receptor blockers (ARBs) and COVID-19 severity (2).

We aimed to evaluate the impact of lockdown on adherence to lifestyle and drug regimens in stay-at-home CCS patients living in urban and rural areas.

## **Methods**

A cross-sectional population-based phone survey was performed in CCS patients included from April 2018 to April 2019 in the RICO (Observatoire des infarctus de Côte d'Or) cohort. RICO is an ongoing survey that prospectively collects data from patients hospitalized for myocardial infarction in all coronary care units of public

centers or privately funded hospitals of one eastern French administrative area (i.e., Côte d'Or). The Côte d'Or has a resident population of 532,901 inhabitants according to the 2019 census, well balanced between urban (>2,000 inhabitants) and rural areas. A sample of 205 patients was randomly drawn. Eight trained interviewers collected data by phone interview during week 16 (April 13 to April 19), i.e. 4 weeks after implementation of the French lockdown (start March 17, 2020). Drug adherence and lifestyle the month before and 4 weeks after the French lockdown implementation were self-perceived and collected during the interview. Study procedures conform to the 1975 Declaration of Helsinki. Oral consent was obtained for each patient.

Qualitative and continuous variables are described using frequency, percentage, and mean ( $\pm$  standard deviation), respectively. The two groups (urban vs rural) were compared using the Chi<sup>2</sup> or Fischer exact test for qualitative variables and the Wilcoxon test for continuous variables.

## **Results**

Among the 195 patients interviewed (of the 205, 3 had died, 1 declined, 6 lost), mean age was  $65.5 \pm 11.1$  years. Most were men (61%). All stated they respected lockdown rules. An important proportion declared increasing symptoms as assessed by angina (8%) or nitroglycerin use (2%). Only six patients (3%) reported drug discontinuation, mainly driven by media influence or family members for clopidogrel (n=2), atorvastatin (n=2), bisoprolol (n=1), and for perindopril (n=1). Strikingly, all 166 (85%) patients taking aspirin continued their prescribed daily intake

**(Figure)**. In contrast, lifestyle rules were much less respected, since almost half (45%) declared >25% reduction in physical activity, 26% of smokers increased their tobacco consumption by >25%, and 24% of patients increased their body weight >2 kilograms. Time spent in front of screens increased in 65% of patients. **Table** shows clinical and lifestyle parameters according to the lockdown location. The decrease in physical activity and the increase in smoking were significantly greater in urban patients.

## **Discussion**

Our study is the first to evaluate short-term consequences of COVID-19 lockdown in stay-at-home chronic coronary syndromes patients.

Patients reported a very high cardiovascular drug adherence, in particular for aspirin. The few cases of drug discontinuation were mainly influenced by the media or family members and not by limited access to care. This very high adherence for the four key cardiovascular therapeutic classes (i.e. antiplatelet drugs, statins, beta-blockers, and ACEIs/ARBs) in **CCS** patients (3) highlighted their self-management abilities and discernment regarding alarming information broadcast by the media. In France, as in other countries, media-based messages warning about ACEIs and ARBs started with the implementation of lockdown, and were compounded by disagreement on strategies among experts (2). Other powerful messages on the deleterious impact of taking nonsteroidal anti-inflammatory drugs in case of COVID-19 may have been misinterpreted or could have alarmed aspirin users (4).

In contrast, lockdown negatively impacted lifestyle management, leading to an increase in unhealthy behaviors. In particular, a rapid (i.e. after only 4 weeks) decrease in physical activity was common (>50% in the urban population and 35% in the rural population). Moreover, body weight was reportedly increased in >25% of patients, which could be related to diet modifications, psychosocial stress and reduced physical activity. Interestingly, a high rate of smokers ( $\approx$ 25%) reported increased smoking. Probably because public meetings were prohibited, the increase in alcohol consumption was only 5%.

Our study has limitations. First, it was conducted in only one French administrative area which may limit the generalisability of our findings. However, it was a population-based study characterized by a well-balanced proportion of urban and rural areas. Our study sample size was also small, which also limits the conclusions of our findings. Finally, we did not evaluate mid- and long-term impact of COVID-19-related lockdown.

The COVID-19-related lockdown had a negative impact on lifestyle in a representative sample of stay-at-home CCS patients (5).

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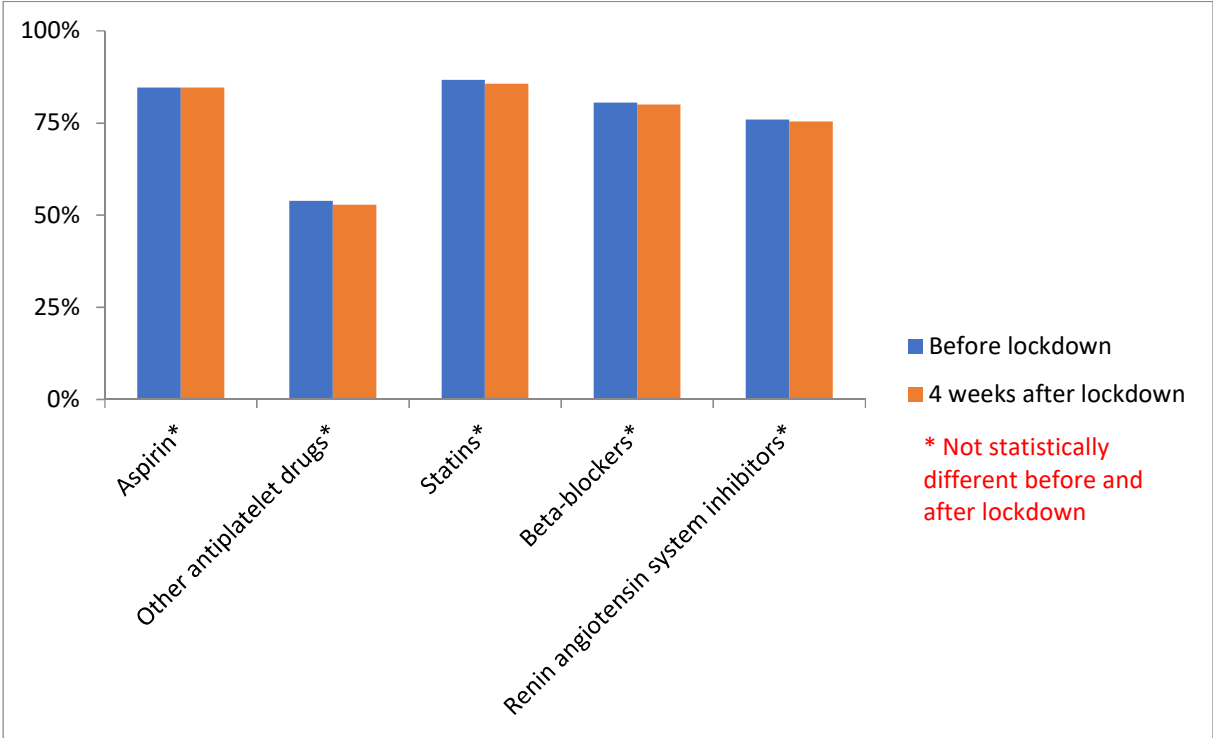
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**Figure legend.**

Drug adherence before and 4 weeks after the start of lockdown

**Table. Clinical and lifestyle parameters**

|  | Total<br>(n=195) | Urban area<br>(n=116) | Rural area<br>(n=79) |
|--|------------------|-----------------------|----------------------|
| <b>Clinical parameters</b>                             |                  |                       |                      |
| Increase in acute angina symptoms, n (%)               | 12/154 (7.8)     | 8/96 (8.3)            | 4/58 (6.9)           |
| Nitroglycerin use increase, n (%)                      | 3/131 (2.3)      | 3/83 (3.6)            | 0/48 (0)             |
| <b>Lifestyle parameters</b>                            |                  |                       |                      |
| Physical activity, n (%)*                              |                  |                       |                      |
| >25% decrease  | 87/193 (45.1)    | 59/114 (51.8)         | 28/79 (35.4)         |
| No change  | 90/193 (46.7)    | 45/114 (39.4)         | 45/79 (57.0)         |
| >25% increase  | 16/193 (8.2)     | 10/114 (8.8)          | 6/79 (7.6)           |
| Smoking increase (>25%), n (%)*                        | 7/29 (24.1)      | 7/17 (41.2)           | 0/12 (0)             |
| Alcohol consumption increase (>2 daily glasses), n (%) | 8/147 (5.4)      | 4/84 (4.8)            | 4/63 (6.3)           |
| Body weight increase (>2 kg), n (%)                    | 48/186 (25.8)    | 30/111 (27.0)         | 15/75 (20.0)         |

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\* $P < .05$  (Fisher exact test) difference rural vs urban