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SHORT REPORT



## Lower ST-elevation myocardial infarction incidence during COVID-19 epidemic in Northern Europe

Jarkko Piuholaa, Risto Kerkelä<sup>b</sup>, Mika Laine<sup>c</sup>, Geir Øystein Andersen<sup>d</sup>, Andrejs Ērglis<sup>e</sup>, Indulis Kumsārs<sup>e</sup>, Leif Thuesen<sup>f</sup>, Juha Sinisalo<sup>c</sup>, Matti Niemelä<sup>a</sup> and M. Juhani Junttila<sup>g</sup>

<sup>a</sup>Division of Cardiology, Department of Internal Medicine, Oulu University Hospital, Oulu, Finland; <sup>b</sup>Research Unit of Biomedicine, Department of Pharmacology and Toxicology, University of Oulu, Oulu, Finland; <sup>c</sup>Department of Cardiology, Heart and Lung Centre, University of Helsinki and Helsinki University Hospital, Helsinki, Finland; <sup>d</sup>Center for Clinical Heart Research, Oslo University Hospital, Oslo, Norway; <sup>e</sup>Pauls Stradins Clinical University Hospital, University of Latvia, Riga, Latvia; <sup>f</sup>Department of Cardiology, Aalborg University Hospital, Aalborg, Denmark; <sup>g</sup>Research Unit of Internal Medicine, Medical Research Center Oulu, University of Oulu and Oulu University Hospital, Oulu, Finland

### ABSTRACT

We compared the ST elevation myocardial infarction (STEMI) incidence during COVID-19 pandemic (March 2020) to January–February 2020 and to same time period in earlier years 2017–2019 in five Nordic-Baltic tertiary centers. During 2017–2019, there were no marked differences in STEMI incidence between January, February and March. During 2020, there was an average drop of 32% in STEMI incidence in March. The isolation measures may decrease the risk for respiratory virus infection and contribute to the lower STEMI incidence and that we might benefit from firmer suggestions on hand hygiene and social distancing during flu season at least among high-risk individuals.

### ARTICLE HISTORY

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### KEYWORDS

COVID-19; ST-elevation myocardial infarction; incidence

### Introduction

The COVID-19 pandemic has swept the globe with tremendous force. Europe has been effectively paralyzed by the virus with a magnitude last seen during the Second World War. All European countries have enforced different levels of restrictions on social interaction in order to contain the number of patients requiring intensive care due to COVID-19 pneumonia. In Finland, schools have been closed, mass gatherings prohibited and national borders closed since March 18th. The Helsinki area in Southern Finland, has most COVID-19 positive subjects, and has been isolated from the rest of the country since March 28th. With an earlier start in an epidemic, Denmark closed schools, restaurants and national borders by March 11th. In Norway, schools have been closed and mass gatherings prohibited since March 12th. In Latvia, schools have been closed and mass gatherings prohibited since March 13th. During the COVID-19 pandemic, there has been a perception of a decline in the number of patients presenting with STEMI in our hospitals. We aimed to evaluate the STEMI numbers in five tertiary centers to evaluate if there is a true decline in the numbers of STEMI patients.

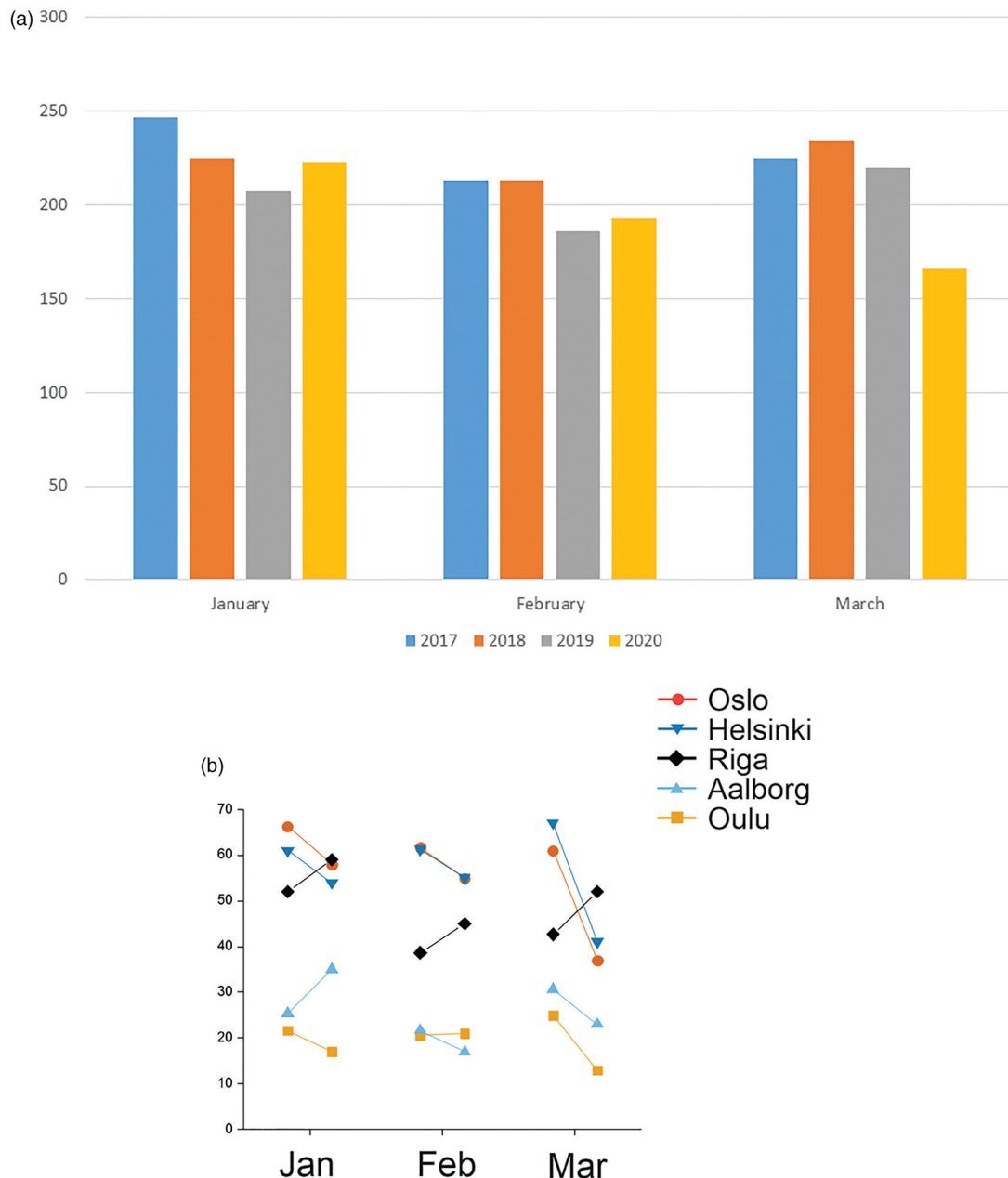
### Methods

Our aim was to determine the incidence of ST-elevation myocardial infarction (STEMI) during the COVID-19 pandemic in four Northern European countries. We focused on STEMI

since non ST-elevation myocardial infarction (NSTEMI) is a heterogeneous patient group regarding diagnosis and etiology. Furthermore, fear of contracting COVID-19 infection may make some NSTEMI patients reluctant to go to the hospital during the pandemic. STEMI patients have more severe symptoms and are more likely to seek medical attention. In Nordic countries, public health care is widely available and the issue of cost is not a factor in seeking treatment. This also makes the analysis of patient numbers reliable in tertiary centers in this study. To determine the seasonal variation in STEMI incidence during influenza and other respiratory viral infection season and the effects of COVID-19 pandemic, we collected the incidence of STEMI from five different tertiary centers performing primary PCI (Oulu, Finland; Helsinki, Finland; Oslo, Norway; Aalborg, Denmark; Riga, Latvia) from January to March 2017–2020. The data were collected from local angiographic registries in each center. We compared the STEMI incidence during COVID-19 pandemic (March 2020) to January–February 2020 and to the same time period in earlier years 2017–2019. We used one-way ANOVA test to calculate *p*-value for proportional change of overall average incidence compared to the incidence in March 2020 (SPSS version 21; IBM Corp., Armonk, NY).

### Results

Altogether, 2552 STEMIs occurred during January–March 2017–2020 (Oulu: 253, Helsinki: 718, Oslo: 717,



**Figure 1.** Overall incidence of ST-elevation infarction (A) and in each research center (B) during January to March 2017–2020. (A) Overall incidence (number) of STEMI patients in January, February and March 2017–2020. (B) Average number of STEMI patients in 2017–2019 for January–March (left symbol) and in 2020 for January–March (right symbol) for each research center.

Aalborg: 308, Riga: 556). During 2017–2019, there were no marked differences in STEMI incidence between January, February and March. During 2020, there was an average drop of 32% (95% CI: 3.2–8%) in STEMI incidence in March compared to the overall average incidence in January and February 2020 and January–March 2017–2019 ( $p=0.009$  for the difference in average monthly incidence compared to March 2020) (Figure 1). The drop in STEMI incidence was seen in all but one center with almost identical magnitude. In Aalborg, Denmark the difference was more subtle than in other centers and in Riga, Latvia no difference was found (Figure 1b).

## Discussion

By the end of March 2020, according to Johns Hopkins University COVID-19 registry, the number of diagnosed and deceased COVID-19 patients was: 1446 (17 deaths) in Finland, 4877 (44 deaths) in Norway, 446 (0 deaths) in Latvia and 3294 (104 deaths) in Denmark. The virus has affected Norway and Denmark more than the other countries in our survey, but the situation keeps on changing daily. The drop in STEMI incidence during the pandemic is striking which cannot be explained solely on staying away from COVID-19 virus with the restrictions. In Finland,

Helsinki has over 70% of the COVID-19 positive patients in the country and Oulu is far less affected. Nevertheless, the change in STEMI incidence is essentially the same in both centers.

The explanation for this phenomenon is likely multifactorial. A majority of the population is isolated and working from home. Therefore, decreased work stress might be one of the reasons. On the other hand, the COVID-19 situation may be stressful per se. It is also possible that the patients hesitate to contact the healthcare due to the fear of getting COVID in the hospital. However, in the case of STEMI we consider this an unlikely explanation to the observed large decline in numbers due to the typical course of the disease. Inflammation has been associated with acute coronary events in many previous studies. Annual influenza epidemic has been shown to trigger acute myocardial infarction in some patients [1,2]. Although the seasonal difference in STEMI incidence has not been marked during the last few years, probably due to the effective immunization protocols for influenza in population groups with cardiovascular risk factors. However, other respiratory virus infections (i.e. adenovirus and RS virus) are common during the same

season and can be contracted the same way as COVID-19 and influenza virus. Thus, the COVID-19 isolation measures may decrease the risk for respiratory virus infection and contribute to the lower STEMI incidence. It seems that we might benefit from firmer suggestions on hand hygiene and social distancing during flu season even after the COVID-19 pandemic at least among high-risk individuals.

### Disclosure statement

Authors do not have anything to disclose related to this manuscript.

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