EDITORIAL COMMENT

Face masks and exercise: Novel insights into a contemporary conundrum

Máscaras faciais e exercício: novas perspetivas numa questão contemporânea

Eduardo M. Vilela a,∗, Ricardo Fontes-Carvalho a, b

a Cardiology Department, Centro Hospitalar de Vila Nova de Gaia/Espinho, Portugal
b Cardiovascular Research Center (UnIC), Faculty of Medicine, University of Porto, Porto, Portugal

Physical activity plays a pivotal role across the cardiovascular continuum, and is associated with several benefits in both healthy individuals and those with different diseases.1-3 Given this background, regular exercise has been recommended as an integral part of a healthy lifestyle, while also comprising one of the core components of contemporary cardiac rehabilitation (CR) programmes.4 Although the myriad physiological effects of exercise on the cardiovascular system have been extensively reviewed, showcasing their importance in primary and secondary prevention, the recent COVID-19 (SARS-CoV-2 associated disease) pandemic has provided novel challenges concerning its application.1-3 Indeed, although the substantial worldwide impact of the COVID-19 pandemic on healthcare systems has been widely recognized, its toll on both physical activity levels and CR programs should also be pondered with.2-5 Since the start of the pandemic several measures have been advocated to mitigate the risk of infection and of spreading the virus, some of which have included social distancing (with different countries also undertaking periods of lockdown) and the use of personal protective equipment, including face masks of varying types.2,5 While there are data supporting the utilization of face masks, with these being currently commonplace in different contexts, there has also been interest in assessing their potential impact in individuals performing exercise, as these could be associated with detrimental effects.2,4,6,7

In the current issue of the Journal, Pimenta et al. provide interesting data on the cardiorespiratory impact of the use of face masks (a surgical disposable three-layer mask and a KN95 respirator) in a group of twelve healthcare workers.7 In this study, individuals randomly performed three standard exercise stress tests on a treadmill: one without a mask and two with different face masks, respectively. Beyond test duration, this study provides insights in terms of some physiological parameters (such as blood pressure, heart rate and peripheral oxygen saturation) as well as ratios of perceived exertion and dyspnea (according to the Borg scales of perceived exertion and dyspnea, respectively). The current report further categorized each test according to the percentage of total time as 25, 50, 75 or 100% (to account for the fact that fewer observations were present in later stages of the protocol).

In this study, comprising a relatively young (mean age 29.8 years-old) healthy population including mostly male and active individuals (58.3% of which had moderate to high levels of physical activity), using a face mask was associated with a shorter duration of the exercise test, whereas no difference was noted when comparing the different types of masks. Of note, although mean values of peripheral oxy-
gen saturation differed at the end of the test (94.5% when
without a mask, 92.5% and 91.3% when using a surgical mask
or a respirator), when comparing mean differences ac¬
cord¬
ing to test subcategories, significant reductions were only
described when comparing no mask utilization to respira¬
tor use at test completion. Moreover, no differences were noted
in terms of heart rate or mean systolic final blood pressure.
Also, interestingly, although effort and dyspnea perception
differed among the three groups, being greater in those with
face masks when compared to those without, when ana¬
lyzing mean differences at the pre-specified categories, no
significant differences were present when comparing both
types of masks. It is worthy of mention, and as described
by the authors, these scales diverged at different time¬
points when comparing those without masks to those using
them.

The use of face masks has been adopted progressively
over the course of the pandemic, with different reports
advocating their use in the setting of CR programmes.2,3
As such, a comprehensive assessment of the possible over¬
all impact of their use is of great relevance, as it enables
both adequate counselling of individuals undergoing ex¬
ercise training as well as the tailoring of their programmes.1,4,6
Furthermore, it may be hypothesized that differences in
functional parameters might need to be accounted for when
analyzing results of exercise interventions (especially in
terms of benchmarking results, when compared to time¬
points in which no face masks were used). In this regard,
and as explored by Pimenta et al., several studies have been
undertaken to try to address this issue.3,4,5,6,7 Notably, how¬
ever, and as discussed in the current report, there has been
some divergence of results on the impact of face masks in
individuals doing exercise.2,7,9 Although some studies have
shown differences in terms of ventilatory parameters and
exercise capacity,4,6 a review by Hopkins et al. showed that
while the use of face masks during exercise may be associ¬
ated with increased levels of dyspnea and effort perception,
its effects in physiological parameters such as blood gases
and work of breathing tended to be relatively small.8 This
point has also been suggested in another recent review.9
Some of the mechanisms that have been proposed as can¬
idates for explaining these findings range from increases
in resistance, dead space ventilation and derangements in
thermal regulation to psychological aspects.3,4 As described
by Haraf et al., these latter points may be of importance
to the interindividual subjective response to the use of face
masks while exercising, though other factors (as mentioned
above) should remain under consideration.3,9

Nevertheless, several limitations to the current data on
this topic should be noted. Firstly, most of the reports in
the literature relate to healthy (or presumably healthy)
individuals.8 As such, large studies designed specifically for
individuals with cardiovascular or respiratory disease should
be the focus of further research, as even small differences
in physiologic parameters such as those in end-tidal carbon
dioxide could be of relevance in these subgroups.4,6,8 Sec¬
ondly, studies mostly addressed the impact of the use of face
masks after an acute bout of exercise.4,6,7,9 As such, data on
the impact of the prolonged use of face masks would be
of relevance, given potential adaptations in terms of car¬
diorespiratory and hematological parameters.9 Beyond this,
improper mask utilization could also be a hinderance in real-
world settings.9 Finally, the role of face masks in different
contexts and subgroups of individuals should also be further
ascertained as vaccination progresses.6,9 As the evidence¬
base for different aspects concerning COVID-19 management
progressively and rapidly expands, these concepts should be
further appraised. The COVID-19 pandemic has provided manifold multidi¬
ensional challenges to cardiovascular medicine in general,
and specifically to exercise training and CR.5 Meanwhile,
advances in modalities such as telerehabilitation, with
the inclusion of hybrid models as well as novel tech¬
nological ancillary tools, should also be acknowledged.2,5
These, in association with risk mitigation strategies, have
allowed for continuity of care in the complex cardiovascu¬
lar patient.2,3,5 Importantly, beyond the pandemic phase,
concepts developed and refined should be integrated into
the contemporary body of knowledge on preventive cardio¬
diology, as these could further help in reducing some of
the longstanding asymmetries and barriers in this field.5
On the one hand, telerehabilitation could, beyond this
phase, allow improvements in CR uptake (an area in need
of improvement, even before the current phase), whereas
the incorporation of remote monitoring could yield rele¬
vant information on functional and physiological parameters
with which to tailor preventive strategies.2,5 On the other
hand, knowledge of the cardiopulmonary response to the
use of face masks may maintain its relevance even after the
pandemic curve recedes. In this regard, reports have con¬
sistently and robustly provided data on the negative impact
of particulate matter air pollution in terms of cardiovascu¬
lar disease.10 Of note, some studies have highlighted the
potential usefulness of face masks in improving certain sur¬
rogates such as blood pressure, in these settings.10 While,
as described in a scientific statement by the American Heart
Association, data concerning the overall role of face masks
in the presence of high levels of particulate matter air pol¬
lution is still elusive, novel insights into this issue, some of
which were serendipitously brought about by the pandemic,
may lead to improved personal protective strategies.10

The COVID-19 pandemic has tested current paradigms
on cardiovascular prevention, stressing the evolving need
for further improvements in comprehensive patient man¬
gement, while reinforcing the paramount role of a transla¬
tional outlook. While current knowledge on some facets of COVID-19 (and cardiovascular disease) man¬
agement is still not fully understood, as illustrated by the
current report, the advances made over this complex time
are central to a personalized view and should also lead to
further reflections on the many challenges which still lie
ahead.

Conflicts of interest
The authors have no conflicts of interest to declare.

References
cardiology and exercise in patients with cardiovascular disease.


