Comments on “Plastic accumulation during COVID-19: call for another pandemic; bioplastic a step towards this challenge?” by Neeraj K. Aggarwal (10.1007/s11356-021–17792-w)

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We have perused with interest the study of Mittal et al. regarding plastic accumulation during the COVID-19 pandemic. The authors have described several aspects of the plastic footprint of medical equipment (masks, gloves, syringes) and behavioral changes associated with the prevention, diagnosis, and management of the disease, and supported the use of bioplastics as an environmentally sustainable alternative (Mittal et al. 2022). While this approach is commendable, we feel that plastic accumulation associated with self and rapid antigen testing deserves more attention.

The exponential use of SARS-CoV-2 testing kits by healthcare professionals and the general public during the recent Delta and Omicron outbreaks calls for a more thorough estimation of their environmental impact. Although bioplastics offer a potent solution for the future, it is crucial to devise an environmental harm reduction strategy based on the existing research, practice, and policy capacity.

As a matter of fact, each self or rapid testing kit contains an average of 10 g of plastic. The CO2 equivalent of this amount of plastic ranges between 15 and 31 g or 22.5 g on average (The Conversation 2021). By the end of the first week of 2022, the overall COVID-19 case notification rate for the European Union and the European Economic Area (EU/EEA), where the authors are based, was 2008 per 100,000 individuals (ECDC 2022a). Roughly, this translates to 15,341,120 cases in the same region, diagnosed with at least one testing kit—notwithstanding the amount of self-tests confirmed with a positive rapid test.

It can be easily projected that the plastic consumed on a weekly basis exceeds 337 tons of CO2 equivalent. This amount adds up to the 335 billion tonnes of CO2 equivalents produced by industry and households in the same area on a yearly basis (Eurostat 2021a). The amount of tests used, and plastic accumulated, could be up to 25 times higher than the given number, given that with a positivity rate close to 4% in most EU member states (ECDC 2022b), up to 96% of the tests conducted have not been calculated. Although such information is not easily accessible, it is reasonable to assume that the majority of this count represents the self and rapid testing kits, which apart from being more affordable and accessible than PCR tests were deemed as sufficient proof of infection in most countries.

While producing relevant figures for other regions of the globe can be cumbersome, the aforementioned numbers stress the need to devise a real-world strategy against the environmental harm caused. Recycling constitutes the cornerstone of an ad hoc approach. Nevertheless, it comes with inherent limitations, because only the external packaging of tests is recyclable (Scottish Government 2021). Given that EU member states tend to recycle 25% of their total plastic waste, 75% of recyclable tests’ components may be not recycled.

Maximizing the recycling rate in this regard can be achieved through increasing plastic recycling points, launching awareness campaigns, and providing financial compensation proportionally to the recycled amount or imposing fines for those not recycling. While the latter can be debatable,
the former can help increase plastic recycling rates beyond tests’ external packaging.

The inability to recycle the testing kit itself can be compensated by enhancing waste-to-energy (WtE) incineration. WtE in Europe has increased by 105% between 1991 and 2020 preventing the creation of several million tons of CO₂ emissions every year (Eurostat 2021b). At this point, technical consultation is necessary to map the capacity of the existing WtE plants to handle the plastic excess and increase it accordingly. Within Europe, countries can coordinate between themselves to manage plastic waste exceeding national WtE capacities. International governance and health bodies can also negotiate in order to make the most out of the available WtE facilities. Certainly, transportation-related carbon footprint should be included in the equation.

Overall, until bioplastics can replace the existing testing kits, it is pivotal to search for environmentally sustainable solutions for plastics management. Aligning decision-making with technical knowledge, while involving the public in this effort, can pave the way to the best results. Beyond the current crisis, lessons learned can serve as a standpoint for sustainable plastic management in the post-COVID era.

Author contribution All authors contributed to the study conception and design. The first draft of the manuscript was written by Christos Tsagkaris and all authors commented on previous versions of the manuscript. Material preparation, data collection, and analysis were performed by Dimitrios V. Moysidis, Andreas S. Papazoglou, and Anna Loudovikou. All authors read and approved the final manuscript.

Code availability Not applicable.

Declarations

Ethics approval Not applicable, the present write-up did not involve patients, animal models, or sensitive data.

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