Chronic Cocaine Induced Bradycardia: a Contributor to Drug Related Deaths?

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The use of wearable devices and monitors to measure physiological markers such as heart rate and respiration, and detect potential drug overdose, is an area of development in the UK and North America where drug-related deaths are high. Whilst testing a smartwatch to refine the algorithm to detect potential overdose, we observed some unexpected, but clinically important findings. Nine participants in a Scottish hostel wore the smartwatch overnight whilst in the hostel, over six nights. Participants' ages ranged from 27-53 years. Cocaine use was reported by eight participants, heroin by six and cannabis by two.

The smart-watch recorded heart rate data that was anonymised and transferred via WIFI to the cloudserver hosted at Manchester Metropolitan University (www.dosecare.org/). We observed heart rate dropping below 40bpm overnight in six cases.

Regular combined use of heroin and cocaine is increasingly common in the drug using population. In the final quarter of 2023, cocaine was the most reported substance in Belfast for the first time within needle exchanges[1] and similarly in Scotland where drug deaths are the highest in the UK there are increased reports of cocaine use to needle exchanges (personal communication, NESI). Heroin and cocaine may be injected together (snowballing) or separately. Both drugs can also be smoked. Heroin, as a central nervous system depressant, reduces respiration, and heart rate. Cocaine, a stimulant, increases heart rate and blood pressure in the short term due to the peripheral release of noradrenaline. Therefore the observation that our participants had such low resting overnight pulse was surprising. A search of the literature identified a small number of studies and case presentations which provided some explanation. Mahoney et al[2] examined heart rate drug use for (n=335) cocaine users. Forty-eight percent indicated bradycardia (heart rate ≤60) and ten percent severe bradycardia (heart rate ≤50). Two studies [3,4] found bradycardia in chronic cocaine users compared to a matched control group. Authors suggested chronic cocaine use may lead to de-sensitisation of beta-adrenergic receptors as the mechanism for bradycardia.

The implications are potentially considerable. Cocaine induced bradycardia with opioid induced respiratory depression puts people at high risk. Increasingly we hear reports (personal communication drug death review group) of deaths occurring following prolonged sleep. The combined use of cocaine with opioids may explain this. To reduce risk, simple pulse checks could identify those at risk. It is crucial clinicians and support services are made aware of these risks to reduce fatalities.

References

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