Cola and honey: Exploring food riddles in rhythm disturbances

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Drinking excessive amounts of cola and eating honey made from the pollen of *Rhododendron*s can cause unusual syncope (fainting) and symptoms of arrhythmia, report two case studies presented as abstracts at the EHRA EUROPACE 2013 meeting, in Athens 23 to 26 June.

"Both these studies underline the importance of clinicians taking detailed medical histories for patients with unexplained arrhythmias and including questions about their dietary intakes," says Professor Andreas Goette, the EHRA Scientific Programme Committee chairperson.

In the first abstract[1] Dr. Naima Zarqane and Prof. Nadir Saoudi, from the Princess Grace Hospital Centre, Monaco, report how excessive consumption of cola drinks can result in marked potassium loss (hypokalemia), QT prolongation on ECGs and potentially life threatening arrhythmias.

In the abstract the team describe the case of a 31 year old woman admitted to hospital for traumatic syncope. Once other problems had been excluded (including a family history of sudden death, digestive symptoms, and metabolic or hormonal abnormalities), tests revealed the patient had blood potassium levels of 2.4 mmol/L, and a QTc (The QT interval on the ECG corrected for heart rate) of 610 ms. Normal blood potassium levels range between 3.5 to 5.1 mmol/L; while the normal QTc for women is less than or equal to 450 ms.

When they took a medical history the clinicians discovered that since the

age of 15 years the patient had exclusively replaced water with cola beverages. When cola consumption ceased on medical advice, the patient's potassium level returned to 4.1 mmol/L at one week, and 4.2 mmol/L at one month, and her QTc duration returned to 430 ms at one week.

A literature search revealed six other case studies where excessive cola consumption could be related to adverse medical conditions including rhabdomyolysis (damaged skeletal muscle tissue), arrhythmias, and even one death related to Torsades de pointes (a form of ventricular tachycardia that can degenerate into ventricular fibrillation).

There are two potential explanations for the connection between cola consumption and low blood potassium level the authors say. Through osmotic principles the high fructose corn syrup content of cola is likely to prevent water from being absorbed by the gut and lead to people suffering from diarrhoea that is associated with heavy fluid losses that 'flush' potassium out of the body. Additionally, caffeine in the cola is also likely to have an effect on the loop of Henle in the kidneys where it reduces the amount of potassium that is reabsorbed. In the heart reduced extracellular potassium can inhibit the potassium current in ion channels and delay ventricular repolarisation that may in turn promote arrhythmias.

"One of the take home messages is that cardiologists need to be aware of the connection between cola consumption and potassium loss and should ask patients found to have QT prolongation about beverage habits," says Dr. Zarqane.

"It's also important that the people are made aware of the potential health dangers of excessive consumption of sugary drinks. There are important political messages for governments to ensure that bottled water is cheaper than sugary drinks, which is not always the case," says

Prof. Saoudi.

In a further study it would be helpful to explore whether there are differences in blood levels of potassium between people who had high cola intakes, and people who did not consume the drink, he says. Excessive drinking of cola and other sugary beverages is likely to have additional adverse cardiovascular effects. "Due to the high calorie intake it's likely to result in weight gain which increases the risk of developing metabolic syndrome," said Prof. Saoudi.

'Mad Honey Poisoning'

In the second abstract[2] Dr. Ugur Turk, from Central Hospital, Izmir, Turkey, reports on the cases of a 68 year old father and 27 year old son who were both admitted to the Izmir emergency department at the same time with symptoms of vomiting and dizziness. Surface ECGs revealed both patients to have complete atrioventricular block and atrial flutter with slow ventricular responses.

When a history was taken both father and son reported that their breakfasts over the past three mornings had included high amounts of honey from the Black sea region of Turkey. This information immediately triggered Turk and colleagues to consider that their patients could be suffering from 'mad honey poisoning'.

Mad honey poisoning occurs after people consume honey contaminated with grayanotoxin, a chemical contained in nectar from the *Rhododendron* species *ponticum* and *luteum*. Grayanotoxin is a neurotoxin that binds to the sodium channels in the cell membrane, maintaining them in an open state and prolonging depolarisation.

"It's like the effect of cholingeric agents, and results in stimulation of the unmyelinated afferent cardiac branches of the vagus nerve which leads

to a tonic inhibition of central vasomotor centres with a reduced sympathetic output and a reduced peripheral vascular resistance,"says Dr. Turk, "This in turn triggers the cardioinhibitory Berzold-Jarisch reflex which leads to bradycardia, continued hypotension, and peripheral vasodilatation."

Mad honey poisoning generally lasts no more than 24 hours, with symptoms of the mild form including dizziness, weakness, nausea, vomiting, excessive perspiration, hypersalivation and paraesthesia. Symptoms of the more severe form include syncope, seizures, complete atrioventricular block and even fatal tachyarrhythmias (due to oscillatory after potentials).

While no specific antidote exists for grayanotoxin poisoning mild cases can be treated with atropine and selective M2 muscarinic receptor antagonists; while for the more severe form treatment options include temporary pacemaker implantation, and vasopressor agents.

The possibility of honey poisoning, says Dr. Turk, should always be considered in previously healthy patients admitted with unexplained hypotension, bradycardia and other rhythm disturbances. The condition occurs most frequently in people who have consumed honey from the Black sea region of Turkey, a major bee keeping area that is also the native habitat of *Rhododendron ponticum* and *luteum*.

"The dissemination of honey around the world means that physicians any where may be faced with honey poisoning," says Dr. Turk. Anyone buying honey from Turkey should first consume a small amount and leave it a few days before eating any more to check that they do not experience strange side effects.

The symptoms of both father and son resolved without the need for any medications and they were discharged from hospital on the fourth day.

When their honey was sent away for melissopalynology, (analysis of the pollen contained in honey) the result revealed it did indeed contain pollen from the *Rhododendron* species.

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