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Effect of mint extract on the ion release from orthodontic wires

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Abstract---Aim: The high incidence of nickel (Ni) allergy and the increasing use of Ni-containing and Cr-containing dental biomaterials have been of growing concern. The purpose of this investigation was to analyse and evaluate the rate of Ni and Cr ion release from different types arch wires used in orthodontics, when immersed in Mint extract. Materials and Methods: Two groups of arch wires (nickel-titanium [NiTi], SS) were stored in Mint extract and tested at different intervals i.e., 1 hour, 6 hour, 12 hour, 24 hour and 1 week. The ions released from the sample (Ni and Cr ions) were evaluated using an atomic adsorption spectrophotometer. Results :Ion release was insignificant in the solutions compared to the control solution Conclusions: It can be concluded from our study that the amount of metal ions released was minimal in Mint extract and it can be safely used as a routine mouthwash in Orthodontic patients.

Keywords---effect mint extract, orthodontic wires, orthodontic patients.

Materials and Methods

Two groups of archwires were used: NiTi and Stainless steel (0.016x0.022 dimensions). These were then immersed in Mint extract and distilled water (control) in a petri dish for varying time intervals (Fig 1)

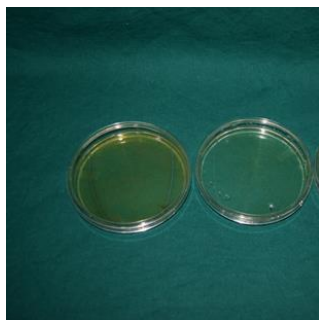


Fig.1 Wires immersed in Mint extract

The time groups used were 1 hour, 6 hour, 12 hours, 24 hours and 1 week. Each time group had 3 samples out of which one sample from all time groups were selected randomly for analysis. A volume of 20 ml of the test solution were collected and stored in glass sample bottles (Fig 2) and tested for the amount of ions present using an Atomic absorption spectrometer



Fig.2 Mint samples stored in glass sample vials

The atomic absorption spectrometer

Atomic absorption spectrometer (Fig.3) measures the quantities of chemical elements present in environmental samples by measuring the absorbed radiation. This is done by reading the spectra produced when the sample is excited by radiation. Atomic absorption methods measure the amount of energy in the form of photons of light that are absorbed by the sample. For every element analyzed, characteristic wavelengths are generated in a discharge lamp (hollow cathode lamp), and in turn are absorbed by a cloud or vapor of that element.



Fig: 3 Atomic absorption spectrometer

Results

Table 1: Nickel ion release from NiTi wires Mint extract

Sample 1 normal water -7.7ppm
Sample 2 Pudina control – 1.07ppm
Sample 3 Niti in pudina mouthwash,1 hour-1.07ppm
Sample 4 Niti in pudina mouthwash,6 hour-1.03ppm
Sample 5 Niti in pudina mouthwash,12hour-1.18ppm
Sample 6 Niti in pudina mouthwash,24 hour-1.00ppm
Sample 7 Niti in pudina mouthwash,1 week-1.16ppm
Sample 8 Blank

Table 2. Chromium ion release from SS wires in Mint extract

Sample 9 Pudina control-7.74ppm
Sample 10 SS in Pudina mouthwash,1 hour-7.83ppm
Sample 11 SS in Pudina mouthwash,6 hour-7.81ppm
Sample 12 SS in Pudina mouthwash,12 hour-7.77ppm
Sample 13 SS in Pudina mouthwash,24 hour-7.79ppm
Sample 14 SS in Pudina mouthwash,1 week-7.76ppm
Sample 15 blank

Table 3. Nickel ion release from NiTi wire in distilled water

Distilled water (Nickel Ion) 0 hour	0.002ppm
1 hour	5.15ppm
6 hour	5.32ppm
12 hour	5.22ppm
24 hour	5.56ppm
1 week	5.89ppm

Table 4. Chromium ion release from SS wire in distilled water

Distilled water (Chromium ion) 0 hour	0.004ppm
1 hour	2.24ppm
6 hour	2.33ppm
12 hour	2.45ppm
24 hour	2.75ppm
1 week	2.67ppm

Tables 1 shows the Nickel ion release from NiTi wire immersed in Mint extract. Tables 2 shows the chromium ion release from stainless steel wire immersed in Mint extract.

Tables 3 shows the Nickel ion release from NiTi archwires in distilled water

Tables 4 shows the Chromium ion release from SS archwires in distilled water

The ion release in respect to Nickel and Chromium from Niti and Stainless steel wires were not significant since the samples showed equal amounts of ions with

respect to the control samples. Both Nickel and Chromium values in Mint extract showed similar concentration of ions compared to the control group which had no wire immersed in it indicating that there was little to no ion release in these solutions. In distilled water both chromium and nickel ion release did not show any variation suggesting a stable nature in distilled water

Statistical analysis

Statistical analysis showed

- a variance of 0.00118 for Nickel release from NiTi archwire in mint extract
- a variance of 0.0011 for chromium release from SS wires in Mint extract.

Conclusion

There was negligible amount of the Nickel and Chromium ions released from NiTi and SS wires in Mint extract and hence Mint mouthwash can be safely prescribed for patients undergoing orthodontic treatment without the fear of ion release from orthodontic arch wires.

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