Urinary fluoride excretion for monitoring fluoride exposure in humans: a systematic scoping review

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Background

- Fluoride (F) plays a key role in the prevention and control of dental caries.
- Excessive accumulation of F in the body can cause serious health problems in teeth and skeletal tissue (Figure 1 and 2).
- Fluorosis development has been directly correlated with F exposure, thus adequate monitoring is needed.

Figure 1. This picture displays dental fluorosis or more simply, mottling and discolouration of the teeth[1].

Figure 2. This image shows a child with skeletal fluorosis that has affected the lower limb area[2].

Aims

- Systematically explore the evidence on urinary fluoride excretion for monitoring fluoride exposure in humans according to criteria.
- Systematically review the evidence according to key features including demographic characteristics, aim of the study, and methodology.
- Identify gaps in the evidence where future research should be targeted.

Materials and Methods

- Identified and collated relevant studies.
- Databases searched included: Medline, EMBASE, Web of Science, Scopus, Cochrane Library, CINAHL and PubMed.
- Devised inclusion and exclusion criteria concerned with 6 aspects.

Population	
Healthy human subjects, adults and children of both gender.	Animals subjects, **unhealthy humans.**
Exposure	
Reported fluoride intake/exposure: water fluoride concentration, diets, toothpaste ingestion, ingestion from supplements, ~~air fluoride.~~	**Given a type of drug to complement exposure without a wash-out period prior to sampling, occupational exposure.**
Outcome	
~~Urine volume/duration,~~ Urine fluoride concentration, urine fluoride levels urine fluoride excretion, urine fluoride retention, fractional urine fluoride retention, fractional urine fluoride excretion.	Did not measure urine as a biomarker for fluoride exposure (dietary and non-dietary).
Study Design	
Research involving interventions (salt fluoridation, milk fluoridation, and water fluoridation), randomised and non-randomised controlled trials, before and after studies, epidemiological studies, ~~occupational studies~~, analytical studies, descriptive cross-sectional studies, ~~other types of review.~~	**Exclude reviews, letters and expert opinions.**
Study Settings	
Schools, preschool, kindergarten, child care centres, workplace, hospital, community.	*In vitro* studies.
Language	
English, Spanish and Portuguese.	All other languages.

Table 1. The table shows the inclusion and exclusion criteria and where changes were made from the original criteria.

Results

- 7 databases searched.
- 1093 non-duplicate articles determined.
- 10% of the 1093 articles were screened using titles and abstracts.
- Lead to the construction of an updated inclusion and exclusion criteria (see Table 1).

This table shows the 6 aspects of the inclusion and exclusion criteria:

- Population
- Exposure
- Outcome
- Study design
- Study settings
- Language

Words highlighted in bold or with a line through implicate where changes were made to make the updated criteria more refined.

Conclusions

Continuation of research…

- Further 90% to be screened using the updated criteria.
- Data extraction from selected full texts.
- A PRISMA flow diagram should be created for the next stage of the process.

References

1. What is fluorosis? - About Your Teeth [Internet]. About Your Teeth. 2018 [cited 30 September 2018]. Available fromhttp://www.aboutyourteeth.com.au/children/dental-fluorosis/
2. Fluorosis: A Vicious Disease, But There Is Hope - Everylifecounts.NDTV.com [Internet]. Everylifecounts.NDTV.com. 2018 [cited 30 September 2018]. Available from: https://everylifecounts.ndtv.com/fluorosis-a-vicious-disease-but-there-is-hope-7778

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