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Assessing variability of heavy metal concentrations in follicular fluid: insights from a novel ICP-MS/MS methodology and previously published studies

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INTRODUCTION & AIM

Environmental heavy metals have been associated with female infertility. Follicular fluid (FF), which envelops the oocyte, offers insights into element composition. Nevertheless, standardized studies on its trace elements remain limited. Due to its direct contact with the oocyte, FF is a critical medium through which heavy metal concentrations can significantly impact female fertility. Last year, our group attempted to detect 22 analytes (Ba, Be, Bi, Cd, Ce, Co, Cr, La, Li, Mn, Mo, Ni, Pb, Rb, Sb, Sn, Sr, Ti, Tl, U, V, Zn) in four FF samples from patients undergoing in vitro fertilization, using ICP-MS/MS without sample digestion. Consequently, a novel and reliable methodology was developed. This study aimed to compare our results (**Table 1**) with previous reports, analyze similarities and differences, and identify possible causes.

METHOD

Bibliographic research

PubMed, Scopus®, Web of Science™ — Searchable bibliographic databases

Follicular fluid; Heavy metals; ICP-MS/MS — Keywords

Relevant data mining

Sample; ICP-MS/MS; Elements detected

Data comparison (our results vs. other studies)

RESULTS & DISCUSSION

Table 1. Analyte concentrations found in our study last year, divided into 4 ranges.

Concentration	Analyte
Not Detected	^{9}Be, ^{140}Ce, ^{111}Cd, ^{139}La, ^{208}Pb, ^{238}U
Up to 8.47 µg/L	^{137}Ba, ^{209}Bi, ^{59}Co, ^{55}Mn, ^{95}Mo, ^{60}Ni, ^{121}Sb, ^{118}Sn, ^{205}Tl, and ^{51}V
Up to 41.49 µg/L	^{7}Li and ^{88}Sr
Up to 393.50 µg/L	^{52}Cr, ^{85}Rb, ^{47}Ti, ^{66}Zn

Comparable values for 12 of the 16 elements were found in the literature [1-7], as there is no published data in FF regarding Bi, Sb, and Rb. Some of the comparisons showed very similar data, but most presented considerable variations due to different sources of variation (**Figure 1**).

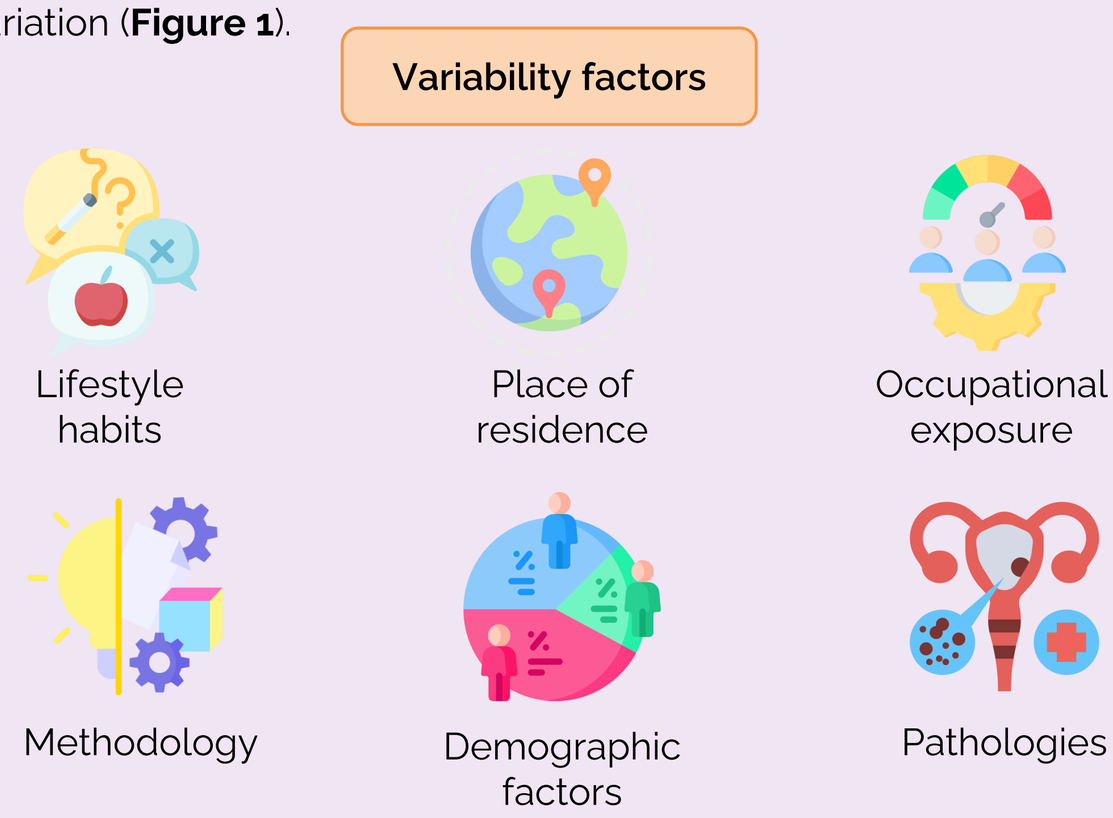

Figure 1. Factors associated with variability in heavy metal concentrations in subjected to comparison data.

CONCLUSION

Although there is similarity in some of the data compared, a great variability still exists. This may be due to different factors such as the methodology used in each case, lifestyle habits, occupational exposure, place of residence, pathologies or demographic factors. It is necessary further study in this field in order to homogenize conditions and obtain more robust results of analysis regarding potentially toxic elements.

REFERENCES

Bibliography