INTRODUCTION

Chronic kidney disease (CKD) is a major worldwide public health problem which causes several disturbances due to an irreversible kidney damage which can progress to renal hypofunction. However, information available for CKD in both pediatric and adult population is limited. As a result, CKD is difficult to diagnose, to follow in progression and to evaluate the response to therapy.

NEW BIOMARKERS TO BE USED IN PEDIATRICS ARE NEEDED

- DNA
- RNA
- Proteins
- Metabolites

OMICS

Useful sciences for finding new potential biomarkers:
- Genomics
- Transcriptomics
- Proteomics
- Metabolomics

METABOLOMICS

Corresponds to the study of small molecules, typically below 1500 Da, in a biological system. Metabolite levels are considered the ultimate response of biological systems to genetic or environmental changes.

TARGETED METABOLICOMICS

- Determination and quantification of known metabolites, suspicious to be altered in a disease
- More complex and specific sample treatment and analytical method

UNTARGETED METABOLICOMICS

- Measurement and comparison of as many metabolites as possible without bias in control and disease groups to find unknown metabolites to be used as new potential biomarkers
- General and more simple sample treatment and analytical method

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EXPERIMENTAL

TARGETED METABOLICOMICS

-32 CKD samples
-24 control samples

* Calibration samples
+ QC samples

UNTARGETED METABOLICOMICS

-32 CKD samples
-26 control samples

* QC samples

RESULTS AND CONCLUSIONS

- **Targeted metabolomic approach**: Univariate analysis showed that glycine, citrulline, creatinine, asymmetric dimethylarginine (ADMA), and symmetric dimethylarginine (SDMA) were significantly increased for CKD pediatric patients. Similarly, regarding multivariate analysis, S-adenosylhomocysteine, SDMA, creatinine, citrulline, S-adenosylmethionine (SAM), ADMA, glutathione, dimethylglycine and glycine were found to be increased in pediatrics with CKD. Moreover, PCA showed that both groups are well separated and it is possible to predict the early stages of the disease with a more than 10 % better accuracy in comparison with the use of creatinine only including these analytes.

- **Untargeted metabolomic approach**: Around 15 entities were found to be significant after doing data pre-processing and subsequent data analysis. Identification of these entities using different databases and MS/MS fragmentation analysis is being performed.

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