

Determination of urinary metabolic profiles of children with central and peripheral precocious puberty

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INTRODUCTION

Puberty is a physical, hormonal and psychosocial transition from childhood to adolescence. Precocious puberty (PP) is the beginning of secondary sexual characteristics before eight years of age in girls. The most common type is known as "central precocious puberty (CPP)".

CPP occurs due to early activation of the hypothalamus-pituitary-gonad (HPG) axis.

Although the real trigger for idiopathic CPP is unknown, it has been proposed that it may be caused by the interactions between genetics, neurotransmitters in central nervous system and hormonal factors.

"Peripheral precocious puberty (PPP)" is a rarer and different condition.

In PPP patients, there is a deactivation of the HPG axis depending on the peripheral causes

Today, innovative technologies enable detailed screening analyzes of genomes, transcriptomes, proteomes and metabolomes.

METHODS

The most recent "omics technology" is "metabolomics". In metabolomics, metabolites (<1000 Da) in a multitude of different physical properties in a tissue or body fluid can be both qualified and quantified, usually by gas chromatography-mass spectrometry (GC-MS). After the complex chromatograms were separated, the retention times of the peaks are corrected and metabolites can be identified using indexed libraries and evaluated statistically. The aim of this study was to determine urinary metabolic biomarkers that could be used for CPP and PPP diagnosis or perhaps for treatment.

RESULTS

- Control girls (n=50) with no history of any endocrine disorder, girls with CPP (n=50) and girls with PPP (n=50) with age ranges of 8-10 years were recruited to the study.
- After extraction, derivatization and GC-MS analysis, urinary metabolic profiles of the study groups were compared by using principle component analysis (PCA) and principle component analysis (PLS-DA).
- We found that glycolic acid, porphine, leucine, P-cresol and fructose levels were different among the study groups.
- Moreover, in PPP group; glucose, mannitol glycolic acid and tyrosine levels were markedly increased vs. control.
- In CPP group, leucine and mannitol levels were higher than control girls. When we compared PPP and CPP groups, porphine, P-cresol, leucine, creatinine, inosine, mimosine and glycolic acid were higher in CPP group vs. PPP group.
- These findings show that both protein and carbohydrate metabolisms are different among the study groups.

DISCUSSION

However, our results indicate that urine may not be a good biological fluid to determine the metabolic differences in girls with CPP and PPP and plasma may be better choice to investigate the differences between the metabolomics profiles of girls with CPP or PP.

