CHRD 2021: Abstract & Poster Submission Form

Submitter Name

Parnia (First)

Azimian Zavareh (Last)

Email

azimianp@myumanitoba.ca

Research Category:

- ◉ Basic Science
- ○ Clinical
- ○ Community Health / Policy

What was your role in the project?

- ☑ Design
- ☑ Perform Experiments
- ☑ Analyze Data
- ☑ Write Abstract
- ☐

Presenter Status:

- ○ Undergraduate Students
- ◉ Masters Student
- ○ PhD Student
- ○ Post-Doctoral Fellows
- ○ Residents
- ○ Non-Trainee

Title

Fetal Alcohol Spectrum Disorder (FASD) Associated Dental defects -Insights from Zebra fish (Danio rerio) and Mexican Tetra (Astyanax mexicanus)

Background

Fetal Alcohol Spectrum Disorder (FASD) is described as birth defects associated with prenatal alcohol exposure. Craniofacial and dental anomalies represent 80% of the defects observed in children with FASD. Clinical and experimental animal studies show that embryonic alcohol exposure can affect the early Tooth Development (TD). The cell signaling pathway molecules such as bone morphogenetic proteins (BMPs) and Wnt signaling pathway are important for proper TD. Studies on zebrafish (ZF) and Mexican tetra (MT) provide many advantages toward understanding the morphogenetic mechanisms of craniofacial development, including TD.

Objective

The objectives of the present study are to characterize the dental phenotypes induced by alcohol in ZF and MT.

Methods

Wild-type and Transgenic Tg (sox10:egfp+/–) ZF and MT cave and surface fish embryos were treated with 1% alcohol, BMP (Dorsomorphin) and Wnt (LiCl) pathway inhibitors at 10 hours post fertilization (hpf). Samples were fixed at different stages and whole mount bone and cartilage staining, serial histological sectioning, in situ hybridization and immunohistochemistry and molecular analysis were carried out to identify the cellular genetic defects of the dentitions.

Results

Whole mount bone staining samples of wild type ZF shows defects in the mineralization of the dentition. Further, the size and the shape of the teeth are affected in the alcohol, BMP and Wnt pathway inhibitors samples. Similar dental defects were observed in the MT morphs. qPCR analysis of alcohol treated samples showed differential expression of Bmp and Wnt signaling pathway genes. Down regulation of the Bmp4 and Wnt, mRNA expression observed in the head region of the 1% alcohol exposed embryos compared to the control.

Conclusion

Embryonic alcohol exposure affects the development and patterning of the dentition in ZF and MT. Our results highlight the efficiency of teleost fish models in understanding the morphogenetic mechanism of FASD associated tooth defects

Authors

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Name	Email	Role	Profession
Parnia Azimian Zavareh	azimianp@mymanitoba.ca	Presenting Author	Graduate
Dr.Devi Atukorallaya	Devi.Atukorallaya@umanitoba.ca	Co Author	Assistant Professor