

# Paternal Teratogens Exposure and Risk of Congenital Heart Disease in Offspring: A Two-Year Retrospective Observational Study

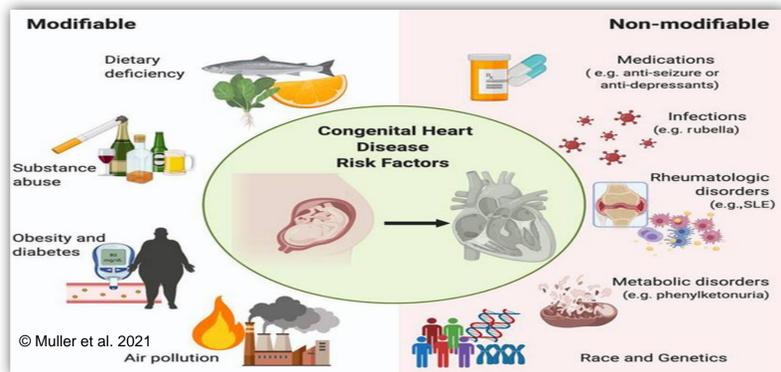
Shadab Ahamad<sup>1</sup>, Paramvir Singh<sup>2</sup>, Anuj Sharma<sup>2</sup>, Adhi Arya<sup>2</sup>, Prachi Kukshal<sup>1</sup>

<sup>1</sup>Sri Sathya Sai Sanjeevani Research Foundation, Palwal, Haryana, India

<sup>2</sup>Sri Sathya Sai Sanjeevani International Centre for Child Heart Care & Research, Palwal, Haryana, India

## INTRODUCTION

- ✓ Congenital heart disease (CHD) is the 4<sup>th</sup> leading cause of global infant mortality, with complex etiology involving genetic, environmental factors, or an interactive effect.<sup>[1]</sup>



- ✓ Peri-conceptional maternal addictions are known risk factors for CHD.<sup>[2]</sup>
- ✓ The impact of paternal non-therapeutic teratogen exposure (PTE) in CHD manifestation is underexplored, despite its potential effects on sperm quality and maternal health.<sup>[3]</sup>

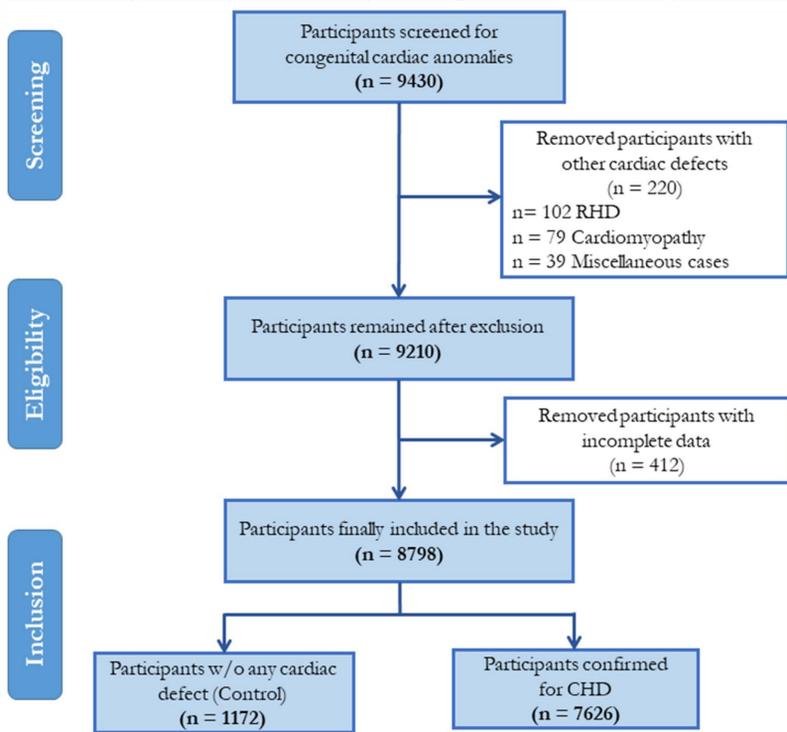
## OBJECTIVE

To investigate the association between PTE and CHD risk, focusing on its correlation with socio-demographic, socio-economic, and clinical factors.

## METHODOLOGY

- ✓ Study Design: Case-control Observational Study (as per STROBE)
- ✓ Study Participants: Families of patients of Indian ethnicity who underwent echo-cardiography during 2022 to 2024 at Sri Sathya Sai Sanjeevani Hospital- A Totally free of cost tertiary cardiac care centre
- ✓ IEC Approved with waiver in consent

Figure 2: Recruitment of Participants & Study Design



CHD, congenital heart disease; RHD, rheumatic heart disease

\* Statistical Tests (SPSS):  $\chi^2$  /Fisher's Exact Test, Multivariate Regression

- ✓ PTE Assessed: Consumption of alcohol, smokeless tobacco (ST), and pan-masala (areca nut)

## REFERENCES

- [1] Pierpont ME, et al. *Circulation*. 2018; 138 (21): e653-e711.
- [2] Khalilipalandi S, et al. *Can J Cardiol*. 2024; 40 (12): 2476-2495.
- [3] Lee PM, et al. *Am J Prev Med*. 2024; 67 (1): 105-113.
- [4] Otte WM, et al. *PLoS Biol*. 2022; 20 (2): e3001562.
- [5] Mohanty M, et al. *Preventive Medicine Research & Reviews*. 2024; 1(3): 166-167.

## RESULTS & DISCUSSION

Figure 3: A Gist of Paternal Addictions in CHD Families

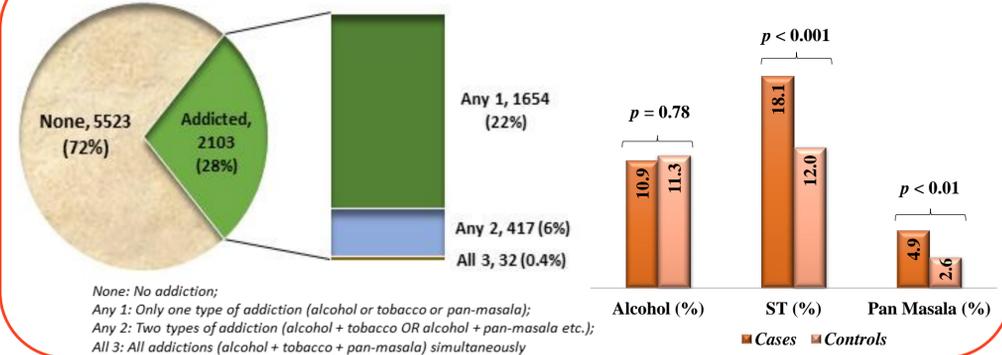


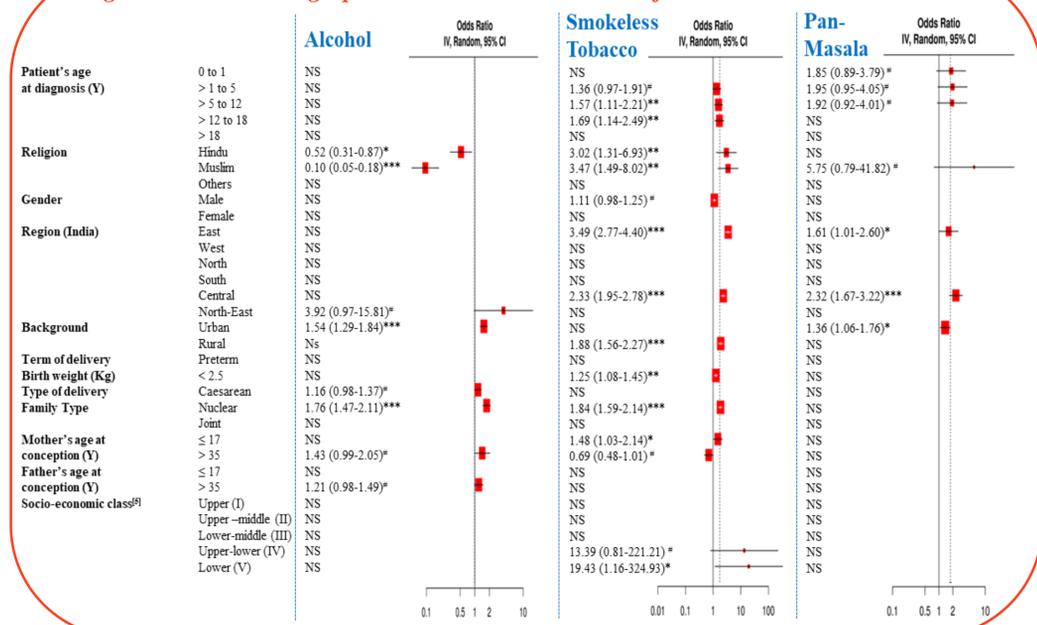
Table 1: Case-Control Association of PTE with CHD & its Sub-phenotypes

Category (Counts)	OR (95 % CIs)		
	Alcohol	Smokeless Tobacco	Areca Nut
Combined CHD (7626)	NS	1.62 (1.35-1.95)***	1.95 (1.33-2.84)***
Acyanotic CHD (5526)	NS	1.51 (1.25-1.82)***	1.83 (1.24-2.68)**
Cyanotic CHD (2100)	NS	1.94 (1.58-2.38)***	2.26 (1.51-3.41)***
Atrial Septal Defect (1050)	NS	1.61 (1.27-2.03)***	1.74 (1.09-2.78)*
Ventricular Septal Defect (2711)	NS	1.59 (1.30-1.95)***	1.76 (1.17-2.65)**
VSD + PS (94)	1.62 (0.92-2.85)#	1.98 (1.17-3.34)**	NS
Patent Ductus Arteriosus (594)	0.76 (0.54-1.06)#	NS	2.46 (1.49-4.03)***
AVSD (222)	NS	1.51 (1.02-2.23)*	2.96 (1.58-5.52)***
PS or AS (257)	NS	NS	NS
Single Ventricle except TA (146)	NS	NS	2.21 (1.01-4.91)*
Tetralogy of Fallot (1331)	NS	2.03 (1.63-2.53)***	2.08 (1.35-3.22)***
TGA (269)	NS	2.14 (1.54-2.99)***	2.41 (1.29-4.48)**
TAPVC (246)	0.55 (0.32-0.94)*	1.68 (1.17-2.42)**	2.12 (1.09-4.13)*
Tricuspid Atresia (209)	NS	1.63 (1.09-2.41)*	3.37 (1.82-6.23)***
Misc. Cases (497)	NS	NS	NS

AS: Aortic stenosis; AVSD: Atrio-ventricular septal defect; CHD: Congenital heart disease; CIs: Confidence intervals; Misc.: Miscellaneous; OR: Odds ratio; PS: Pulmonary stenosis; TA: Tricuspid atresia; TAPVC: Total anomalous pulmonary venous connection; TGA: Transposition of great arteries

NS: Non Significant; # 0.05 < p ≤ 0.15 (Trend<sup>[4]</sup>); \* p ≤ 0.05; \*\* p ≤ 0.01; \*\*\* p ≤ 0.001

Figure 4: Socio-demographic & Clinical Risk Factors for CHD in Addicted Families



## CONCLUSION

- ✓ Our study highlights the strong link between PTE, particularly to pan-masala (explored firstly globally), and increased CHD risk, highlighting critical socio-economic & regional risk factors.
- ✓ Areca nut and ST consumption, prominent in nuclear and low socio-economic families, nearly double the risk of severe and cyanotic CHD.
- ✓ It emphasizes the need for targeted prevention and further research on paternal addiction's impact on offspring health.