

## ABSTRACT

### The Genetic Polymorphism of Alcohol Metabolizing Enzymes in the two Major Ethnic groups of Trinidad and Tobago

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The genotype and allelic frequencies of genes encoding enzymes involved in alcohol metabolism were evaluated in two major ethnic groups of Trinidad and Tobago. The aims of this study were to establish associations between these genotypes and genetic predisposition to alcohol dependence, alcohol related disorders and alcoholic liver disease. Whole blood samples were collected for polymerase chain reaction (PCR)-based genotyping from two hundred and fifty-five (255) individuals; 165 Indo-Trinidadian (102 alcohol dependent, 63 non-alcohol dependent) and 90 Afro-Trinidadian (45 alcohol dependent, 45 non-alcohol dependent). The polymorphisms analyzed were *ADH1B*, *ADH1C*, *ALDH1A1*, *ALDH2* and *CYP2E1* *RsaI*/*PstI*.

Significant differences ( $p < 0.05$ ) in allele frequencies were observed in Indo-Trinidadians between alcoholics (alcohol dependent) and controls (non-alcohol dependent) for *ADH1C*\*2 (0.304 and 0.198 respectively) [ $\chi^2 = 4.466$ ,  $df = 1$ ,  $p = 0.035$ ] and *ALDH1A1*\*2 (0.111 and 0.016 respectively) [ $\chi^2 = 10.183$ ,  $df = 1$ ,  $p = 0.001$ ]. Significant differences [ $\chi^2 = 9.649$ ,  $df = 1$ ,  $p = 0.002$ ] were also observed in the allele frequencies between Indo-Trinidadians and Afro-Trinidadian alcoholics for *ADH1C*\*2 (0.304 and 0.133 respectively). *ALDH1A1*\*3 was only seen in Afro-Trinidadian controls (0.044) and *ADH1B*\*3 was mainly detected in Afro-Trinidadians (0.144, alcoholics; 0.244, controls) and seen in only one Indo-Trinidadian, a control (0.008). A novel *ALDH1A1* allele, *ALDH1A1*\*4, was identified in an Indo-Trinidadian, alcohol dependent subject. Sequencing of the resultant PCR product revealed that there was an A inserted at position -554 relative to the translational start site, +1.

The *ALDH2*\*2 which offers complete protection from the development of alcoholism is absent in this population. The *ADH1B*\*3, characteristic of Afro-Trinidadians, appears to have a protective role in the development of alcoholism. The *ADH1C*\*2 and *ALDH1A1*\*2 alleles, more frequent in Indo-Trinidadians predisposes to higher alcohol consumption, alcoholism and alcohol related effects. Elevations of hepatic enzymes vary between the two ethnicities and are influenced by the presence of the *ADH1C*\*2 and the *ALDH1A1*\*1 alleles. This study suggests that Afro- and Indo-Trinidadians have significantly different genotypes that confer differential risks for alcohol dependence and related disorders.

**Keywords:** Shelley Maria Moore; ethanol/ alcohol; alcohol metabolizing enzymes; genetic polymorphisms; alcohol dependence.