The Glutathion S-Transferasegene Polymorphisms in Automotive Technician

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Abstract

the Glutathion S-Transferase in human are an important detoxification enzymes which may be affected by different factors, the current work is a case control study consist of 32 Automotive Technician and 29 healthy individuals for GST types polymorphismsincluding (GSTT, GSTM and GSTP), the results found that GSTT null genotype was higher in Automotive Technician than control in significant differences (p 0.0300), the GSTM null genotyping didn't find in Automotive Technician, while it found in (6.89%) of control group in non-significant differences (p 0.285). high percentage of GSTP null genotyping was recorded in control group than Automotive Technician group in non-significant differences (p 0.139).The present output found that there was an association of GSTT null genotyping with Automotive Technician, other GST types didn't affect by this employment, further investigations may be suggested to detect other SNPs in GST genes.

Keywords: Glutathion S-Transferasegene, polymorphisms, Automotive Technician

Introduction

the GlutathionS-Transferase enzymes in human classified to five classes included A (alpha), M (mu), P (pi), T (theta) and Z (zeta) (Beckett et al., 1993: Board et al., 1997). The detoxification enzymes among them are GSTT1 GSTP1 and GSTM1, which metabolize different molecules of carcinogens from smoke, dietand tobacco, including polycyclic aromatic hydrocarbons and heterocyclic aromatic amines (Hirvonen, 1995). The GSTs enzymes types are polymorphic and inter-individual variations in their levels and activities. The deletion genotypes of and *GSTT1and GSTM1* lead to an absence production and they are relatively more common in differentcountries (Garte et al., 2001). In *GSTP1* gene A transition mutation (A>G) at exon 5 (n 313)causes Ile changing to Val at site 104 in the corresponding protein. The CSTP polymorphism causes decreased in activity and affinity of electrophilic molecules(Garte et al., 2001).
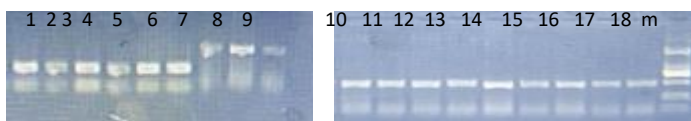
The exposure to toxicant and chemicals from occupational environment could pose health challenges mainly correlated with gout, renal failure,hepatotoxicity and encephalopathy(Brautbar et al., 2002; Herman et al., 2007).the liver is the most organs influenced by xenobiotics' metabolism (Ajani et al., 2011). The toxic products Exposure likebenzene, volatile hydrocarbons, and petroleum fumes impact in kidney and liver (Uboh et al., 2009; Uboh et al., 2005; Rana et al., 2005; Udonwa et al., 2009; Soni et al., 2016).

The workers in car repair section suffered from exposure to different pollutants that considered as a risk factors, like lead, fine dust, polycyclic aromatic containing gases, the CO, and mineral oils. The literature reported each biological damages For each pollutant types, like oxidative stress that induced individually (Lopes et al., 2016; Alfonso et al., 2015; Chew et al., 2015; Rezaei et al., 2015).

Methodology

Current study included 30 individuals who worked in the Automotive Technician workshop and 29 healthy individuals as control group, the age ranged (23-40) years with work time ranged (5-7) hours daily. Samples were collected with approval from each contributer, blood samples were kept in EDTA tubes then DNA was extracted using kit, target genes includedGSTT1, GSTM1 and GSTP1 were targeting using specific primers, GSTM1amplified 215 bp and GSTT1amplified 312 bp and GSTP1amplified 308bp (Kiran et al., 2010) The amplification programs was (95 ℃, 59 ℃, 72 ℃) for 30 sec to each steps and repeated to 30 cycles in addition to pre-denaturation 95 ℃ for 5 min and 72 ℃ as a final extension for ten min.

Results and discussion

Figure (1) the electrophoresis of The GST genes in Automotive Technician samples, lanes 1-6 represented GSTP, lanes 7-9 GSTM, lanes 10-18 GSTT, m DNA ladder (110-1000pb).

The current study deal with The GST gene polymorphisms in Automotive Technician

Genotyping	**Automotive Technician**	Control group	Odd ratio (CI95%)	Significant value
GSTT Present	18 (56.25%)	24(82.758%)	3.7333 1.1357 to 12.2723	0.03
Null	14(43.75%)	5 (17.241%)		
GSTM Present	32 (100%)	27(93.103%)	0.1692	0.2581
Null	0	2(6.89%)	0.0078 to 3.6770	
GSTP present	29(90.62%)	22(75.86%)	0.3251	0.1319
Null	3(9.375%)	7(24.13%)	0.0754 to 1.4023	

 that including (GSTT, GSTM and GSTP), figure (1) and table (1) clarified the electrophoresis pattern of GST target sequence amplifications and the odd ratio values, the results found that GSTT null genotype was higher in Automotive Technician than control in significant differences (p 0.0300), the GSTM null genotyping didn't find in Automotive Technician, while it found in (6.89%) of control group in non-significant differences (p 0.285). high percentage of GSTP null genotyping was recorded in control group than Automotive Technician group in non-significant differences (p 0.139).

The current study found strong association of GSTT with the Automotive Technician employment in some Iraqi cases that suffered from elevation in heavy metals levels (data not shown) and work without any protection equipment's that made their exposed to different pollution molecules, the GST was chose in the current study because the GST Proteins family are enzymes removing a wide range of hazardous molecules, like xenobionts and ROS(Yang et al., 2009), the function of these proteins are induced conjugation of several chemical molecules (exogenous and endogenous) with glutathione (Kazubek et al. 2010; Drobná et al., 2012), for instance,detoxification the product of lipid peroxidation, prostaglandins, chemotherapeutics types, and the environmental carcinogens substances, like heterocyclic aromatic amines (Drobná et al., 2012). The GST enzyme catalyzed association between electrophilic molecules with reduced glutathione is aimed to reduce the possibilities of hazardous impacts of molecules with strongly reactivity on cell components, like proteins or nucleic acids. Evidences found that GST enzymes have protection activity of DNA against oxidative effects, that resulted to mutations and in consequence carcinogenesis (Gong et al., 2012).Some reports have been introduced the relation of GSTvarationand the risk of contracting cancer (Yu et al. 2011; Wang et al. 2011).

The null genotyping of GST genes have been documented in wide range of disease and in cases with environment pollutions exposure, and belong of the role of GST enzymes in the removing the toxic molecules from the cells the current study was suggested to detect it in the Automotive Technician in Baghdad city.

The Automotive Technician exposed to gasoline during work and this may be effect in the some vital processing like GST enzymes activity and DNA damage, and this proved by Nourozi et al. (2018) thatobservedcaseshave null GSTT1 or both null GSTT1 and GSTM1 variationhavea higher risk and more susceptible to benzene-induced hematological disorders.In another studyabout 4.5-fold of increased was reported in the risk of benzene exposurein workers population with null GSTT1 genotype (95% CI = 1.13–17.54) compared to the workers with positive GSTT1 genotype (Wan et al. 2002; JX et al. 2006). Consequently, the toxic impacts of benzene may be resulted from overall enzymes interaction that contributed in the pathways of benzene

biotransformation. Thus, the variations of results belong to genetic variation differences of these enzymes in different countries and wide individual diversity in the liver enzymes activity.

Conclusion

The current output found association GSTT null genotyping with Automotive Technician, other GST types didn't affect by this employment, further investigations may be suggested to detect other SNPs in GST genes and its relation with heavy metals levels.

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