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Effect of Oxidative Stress on Glutathione Reductase Activity of Escherichia coli Clinical Isolates from Patients with Urinary Tract Infection

Authors : Fariha Akhter Chowdhury, Sabrina Mahboob, Anamika Saha, Afrin Jahan, Mohammad Nurul Islam

Abstract : Urinary tract infection (UTI) is frequently experienced by the female population where the prevalence increases with aging. Escherichia coli, one of the most common UTI causing organisms, retains glutathione defense mechanism that aids the organism to withstand the harsh physiological environment of urinary tract, host oxidative immune response and even to affect antibiotic-mediated cell death and the emergence of resistance. In this study, we aimed to investigate the glutathione reductase activity of uropathogenic E. coli (UPEC) by observing the reduced glutathione (GSH) level alteration under stressful condition. Urine samples of 58 patients with UTI were collected. Upon isolation and identification, 88% of the samples presented E. coli as UTI causing organism among which randomly selected isolates (n=9), obtained from urine samples of female patients, were considered for this study. E. coli isolates were grown under normal and stressful conditions where H_2O_2 was used as the stress-inducing agent. GSH level estimation of the isolates in both conditions was carried out based on the colorimetric measurement of 5,5'-dithio-bis (2-nitrobenzoic acid) (DTNB) and GSH reaction product using microplate reader assay. The GSH level of isolated E. coli sampled from adult patients decreased under stress compared to normal condition ($p = 0.011$). On the other hand, GSH production increased markedly in samples that were collected from elderly subjects ($p = 0.024$). A significant partial correlation between age and change of GSH level was found as well ($p = 0.007$). This study may help to reveal ways for better understanding of E. coli pathogenesis of UTI prevalence in elderly patients.

Keywords : Escherichia coli, glutathione reductase activity, oxidative stress, reduced glutathione (GSH), urinary tract infection (UTI)
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