Gentamycin is a very effective aminoglycoside. However, its usage is limited by the nephrotoxic and the irreversible ototoxic effects. This study aimed to measure the protective role of both 4-methylcatechol (a nerve growth factor) and silymarin (an antioxidant) against gentamycin-induced ototoxicity. Twenty guinea pigs were divided into four groups and were treated for 19 days: group I (only saline, i.p.), group II (gentamycin 120mg/kg/d, i.p.), group III (4-methylcatechol 10µg/kg 2hrs before gentamycin + gentamycin 120mg/kg i.p.) and group IV (silymarin (100mg/kg by oral lavage 2hrs before gentamycin + gentamycin 120mg/kg i.p.). Auditory brainstem response, nerve growth factor levels, TRKA mRNA in cochlear tissue, serum catalase activity and serum malondialdehyde levels were measured in all groups. Scanning electron microscopic examination of cochlear hair cells was conducted. The main findings indicated that silymarin pre-treatment produced significant decrease in auditory brainstem response (ABR) threshold with significant restoration of nerve growth factor (NGF) levels and increased Trk-A mRNA in cochlear tissue, serum catalase activity and serum malondialdehyde levels were measured in all groups. Scanning electron microscopic examination of cochlear hair cells was conducted. The main findings indicated that silymarin pre-treatment produced significant decrease in auditory brainstem response (ABR) threshold with significant restoration of nerve growth factor (NGF) levels and increased Trk-A mRNA expression in cochlear tissue as well as marked preservation of most of hair cells of the organ of Corti by scanning electron microscopy (SEM) compared to the pre-treatment by 4-methylcatechol. Silymarin caused significant amelioration in the oxidative stress state by reducing malondialdehyde (MDA) levels and increasing catalase activity. It could be concluded that silymarin was more potent than 4-methylcatechol as a protective agent against gentamicin ototoxicity.

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Fig. 1: Scanning electron micrograph of organ of corti of normal control group showing three rows (1,2,3) of outer hair cells (OHCs) and one row of inner hair cells (IHCs). Notice stereocilia of OHCs arranged as V shape and those of IHC arranged in U shape. (Group I, SEM x1500)

Fig. 2: Scanning electron micrograph of organ of corti of gentamicin-induced ototoxicity group showing loss of several inner (IHCs) and outer hair cells (OHCs) (wavy arrows). Stereocilia of these cells showing either fusion (white ►), focal loss(black ►) or complete absence (curved arrow) and irregular arrangement. (Group II, SEM x1500)

Fig. 3: Scanning electron micrograph of organ of corti of 4-methylcatechol treated group showing preservation of most of the hair cells except for few inner (►) and outer hair cells (→). Notice disarray of cilia of IHC (wavy arrow) and fusion of stereocilia of the OHC (curved arrow). (Group III, SEM x1500)

Fig. 4: Scanning electron micrograph of organ of corti of silymarin treated group showing preservation of nearly most of the inner (IHCs) and the outer haircell (OHCs 1,2,3). Notice also will preserved stereocilia (Group IV, SEM x1500)