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# Identification of Multiple Sclerosis Risk Groups in the Egyptian Population: A Cross-Sectional Study for Egypt's Health

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**Abstract :** Background: Multiple Sclerosis (MS) is a chronic autoimmune disease that affects the central nervous system, with a growing prevalence in Egypt. The interplay between genetic predisposition, environmental factors, and immune dysregulation contributes to the disease's onset and progression. In Egypt, where healthcare access and environmental exposures differ from Western contexts, understanding the impact of vaccinations, particularly COVID-19 vaccines, on MS disease activity is crucial. This study examines the relationship between vaccination status, disease characteristics, and clinical outcomes in a cohort of Egyptian MS patients, providing region-specific insights. Additionally, it identifies the risk groups and most susceptible categories to MS in the Egyptian population. Methodology: A cross-sectional analysis was conducted on 100 Egyptian MS patients, with data collected on demographic variables, vaccination status, disease subtype, relapse frequency, Expanded Disability Status Scale (EDSS) scores, and disease duration. Patients were categorized based on their vaccination status: unvaccinated (NONE), partially vaccinated (PART VAC), and fully vaccinated (FULL VAC). Statistical analyses, including ANOVA and Chi-square tests, were performed to assess the impact of vaccination on EDSS scores, relapse rates, and disease onset relative to vaccination. The study also considered unique regional factors, such as pesticide exposure and familial MS history, which are prevalent in the Egyptian context. Results: The study found no significant difference in EDSS scores across vaccination groups (ANOVA, $p > 0.05$), indicating that vaccination status does not significantly influence disability progression in Egyptian MS patients. However, a Chi-square analysis revealed a lower relapse rate among fully vaccinated patients compared to unvaccinated and partially vaccinated groups ($p < 0.05$). Additionally, disease onset after vaccination was more common in fully vaccinated patients, with 16 out of 21 patients experiencing disease initiation post-vaccination, compared to 5 out of 15 in the unvaccinated group ($p < 0.05$). This suggests a potential temporal association between vaccination and disease onset in the Egyptian cohort, though causality cannot be established. Additionally, 80% of MS population are women, 5% of the population have pediatric multiple sclerosis, and 10% have familial MS. Conclusion: In the Egyptian context, vaccination does not appear to exacerbate disability progression in MS patients and may be associated with a reduced relapse rate. However, the observed temporal relationship between vaccination and disease onset highlights the need for further investigation into whether this association is coincidental or indicative of a vaccine-triggered immune response in this population. These findings emphasize the importance of monitoring Egyptian MS patients' post-vaccination and conducting longitudinal studies to better understand the long-term effects of vaccines on MS disease activity in this region.

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