Association of the intercellular adhesion molecule-1 (ICAM-1) gene polymorphisms with endometriosis: a systematic review and meta-analysis

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Abstract

Background Reported associations of the G241R and K469E polymorphisms of the intercellular adhesion molecule-1 gene (ICAM-1) gene with endometriosis have differed in magnitude.

Materials and methods In a meta-analysis of six published case–control studies (from five articles), we estimated risk [odds ratio (OR) 95 % confidence intervals (CI)] of associations with these polymorphisms using the Review Manager 5.3 software.

Results Based on 1213 cases and 1103 controls, overall analysis showed significant increased risk in the homozygous (OR 2.83, 95 % CI 0.99–8.10, \( p = 0.05 \)), dominant (OR 1.86, 95 % CI 1.00–3.46, \( p = 0.05 \)) and codominant (OR 2.15, 95 % CI 1.06–4.35, \( p = 0.03 \)) models. Confined to the studies in Hardy–Weinberg Equilibrium erased the significance (OR 1.59–2.59, 95 % CI 0.81–8.22, \( p = 0.10–0.15 \)). Asian effects were variable (OR 0.93–1.09, \( p = 0.50–0.57 \)), but Caucasian effects were not (OR 4.09–13.60, \( p < 0.0001 \)). Independent data for the late stages of endometriosis suggest protection of the ICAM-1 K469E polymorphism among the Asians (OR 0.91–0.95, \( p = 0.35–0.71 \)). These effects were weak but non-heterogeneous (\( P_{\text{heterogeneity}} = 0.17–0.57, I^2 = 0–40 % \)).

Conclusion In summary, strengths of the overall effects were consistency, significance and robustness but limited by their high heterogeneity. These strengths and limitations were also observed in the Caucasian subgroup which when tested for interaction against the contrasting Asian effects, highlighted Caucasian susceptibility (\( p = 0.004–0.01 \)). The findings are an interplay of strengths and limitations, which warrant awareness of their interpretation as susceptibility markers for this disorder.

Keywords ICAM-1 · Polymorphisms · Endometriosis · Meta-analysis

Introduction

Endometriosis is a chronic and inflammatory condition in which tissue that is histologically similar to the endometrium with glands and/or stroma grows outside the uterine cavity [1]. Being multi-systemic, it can affect several organs, most common in the peritoneum and pelvis, especially the ovaries, and less in the recto-vaginal septum [2]. This results in pelvic pain, dysmenorrhea and infertility [3]. The pathogenesis of endometriosis is genetic [1, 4] and autoimmunity genes maybe involved [5]. A number of genetic studies have been found to be associated with endometriosis in selective populations [6–8]; however, the genes that play a role in endometriosis remain to be explored.

The intercellular cell adhesion molecule-1 (ICAM-1) is a member of the immunoglobulin (Ig) superfamily with a glycoprotein structure [9, 10]. ICAM-1 has been detected...