Gender Influences on Uveitis Etiology: Insights from a Meta-analysis and systematic review

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Introduction

Uveitis shows gender-based differences in causes and prevalence. This study examines these disparities to improve diagnosis and treatment.

Aim:

To evaluate gender-specific differences in the etiology of uveitis through a comprehensive meta-analysis and systematic review, thereby illuminating how sex-based factors may influence disease prevalence, associated conditions, and potential underlying mechanisms.

Methods

the systemic and meta-analysis review conducted following the PRISMA guidelines searching through databases, like PubMed/MEDLINE, Scopus, Central, Web of Science and Google Scholar from January 2014 to January 2024. Our focus was on studies that differentiate between uveitis etiology based on gender. Risk ratios (RR) and 95% confidence intervals (CIs) were estimated using a Mantel-Haenszel random-effects model; heterogeneity was assessed via I^2. Study quality and risk of bias were evaluated using the Newcastle–Ottawa Scale and JBI Critical Appraisal Checklists.

Results

Our analysis revealed pronounced gender-related differences in uveitis etiologies. Females demonstrated a significantly higher risk of uveitis associated with autoimmune conditions, including Systemic Lupus Erythematosus (RR=2.25, p<0.0154), Multiple Sclerosis (RR=2.12, p<0.0015), Sarcoidosis (RR=1.97, p<0.0001), Rheumatoid Arthritis (RR=1.94, p<0.0110), and Juvenile Idiopathic Arthritis (RR=1.87, p<0.0005). Females also showed elevated risk for Vogt-Koyanagi-Harada disease (RR=1.32, p<0.0025) and Toxoplasmosis (RR=1.29, p<0.0458). In contrast, males had increased risk for uveitis linked to conditions such as Eales Disease (RR=0.30, p<0.0006), Sympathetic Ophthalmia (RR=0.52, p<0.0063), Behçet's Disease (RR=0.56, p<0.0001), and Ankylosing Spondylitis (RR=0.57, p<0.0001).

Table 2. Meta-analysis of Gender Differences in Uveitis Prevalence Across Various Conditions

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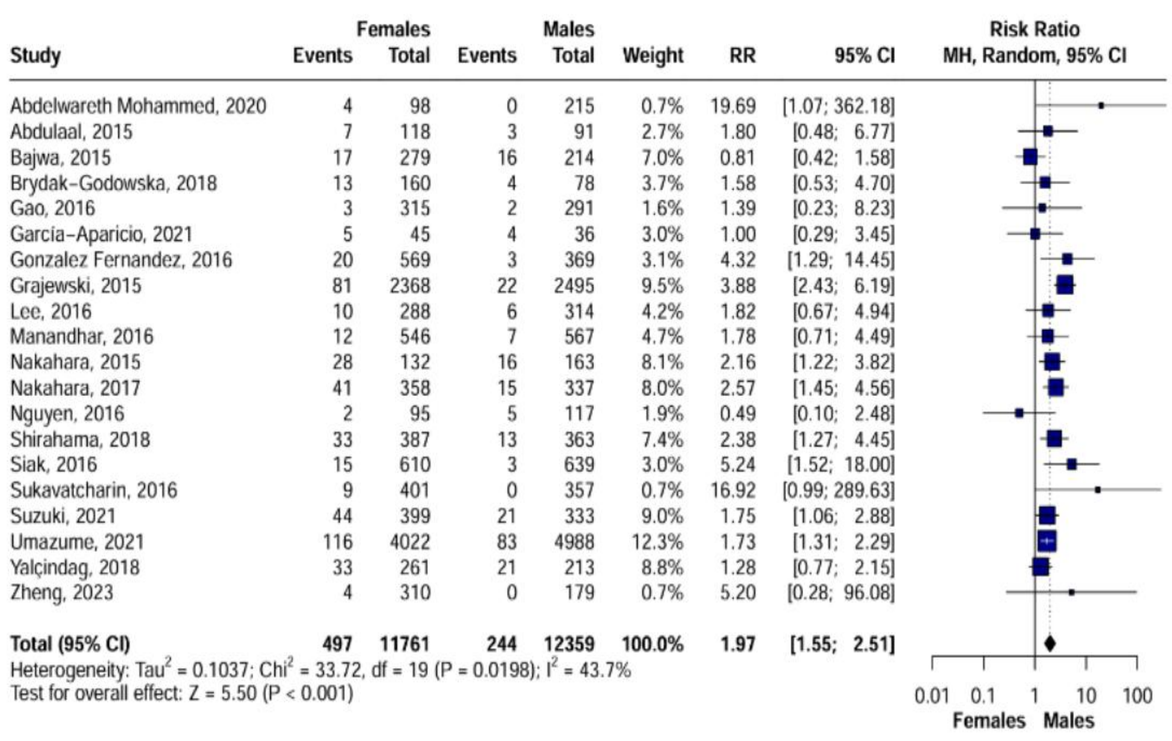
Condition	No. of studies	Female sample size	Male sample size	Female prevalence	Male prevalence	Risk ratio (95% CI)	p-value	Heterogeneity (I^2%)
Infection								
Syphilis	[17]	7,545	7,128	56 (0.74%)	78 (1.09%)	0.64 (0.45 - 0.90)	0.0113	0
Herpetic Uveitis	[18]	7,674	7,413	574 (7.48%)	684 (9.23%)	0.77 (0.59 - 1.01)	0.0567	76.9
Endophthalmitis	[15]	6,744	6,673	83 (1.23%)	121 (1.81%)	0.71 (0.54 - 0.94)	0.017	0
Non-infection								
Systemic Lupus Erythematosus	[12]	5,965	5,800	37 (0.62%)	10 (0.17%)	2.25 (1.17 - 4.34)	0.0154	0
Rheumatoid Arthritis	[12]	5,579	5,521	53 (0.95%)	26 (0.47%)	1.94 (1.16 - 3.23)	0.011	0
Juvenile Idiopathic Arthritis	[16]	6,241	6,085	158 (2.53%)	72 (1.18%)	1.87 (1.31 - 2.66)	0.0005	13.7
Multiple Sclerosis	[7]	3,746	3,579	61 (1.63%)	25 (0.7%)	2.12 (1.33 - 3.37)	0.0015	0
Behçet's Disease	[20]	11,496	12,287	581 (5.05%)	1224 (9.96%)	0.56 (0.42 - 0.75)	< 0.0001	71.6
Posner-Schlossman syndrome	[12]	5,992	6,079	74 (1.23%)	123 (2.02%)	0.64 (0.48 - 0.85)	0.0022	0
Ankylosing Spondylitis	[9]	4,465	4,640	163 (3.65%)	303 (6.53%)	0.57 (0.48 - 0.68)	< 0.0001	0
Sarcoidosis	[20]	11,761	12,359	497 (4.23%)	244 (1.97%)	1.97 (1.55 - 2.51)	< 0.0001	43.7
Vogt-Koyanagi-Harada Disease	[20]	11,723	12,436	549 (4.68%)	404 (3.25%)	1.32 (1.10 - 1.59)	0.0025	42.4
Sympathetic Ophthalmia	[15]	6,905	6,699	26 (0.38%)	53 (0.79%)	0.52 (0.32 - 0.83)	0.0063	0
Eales Disease	[5]	3,659	3,767	9 (0.25%)	41 (1.09%)	0.30 (0.15 - 0.59)	0.0006	0
Diabetes Mellitus Associated Uveitis	[5]	1,612	1,431	8 (0.5%)	26 (1.82%)	0.29 (0.14 - 0.62)	0.0015	0

Sarcoidosis



Conclusions

This meta-analysis reveals significant gender differences in uveitis etiology. Women are more prone to autoimmune-related uveitis, such as lupus and sarcoidosis, while men are more affected by HLA-B27-associated diseases like ankylosing spondylitis. Hormonal, genetic, and immunological factors likely drive these disparities. Recognizing these patterns can improve diagnosis and treatment, while future research should focus on the biological mechanisms and tailored interventions to optimize care.