Antibiotic use increases the risk of developing irritable bowel syndrome: a Systematic Review and Meta-Analysis

Authors

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ABSTRACT

Introduction: Irritable bowel syndrome (IBS) is a disorder of gut-brain interaction which negatively affects patients' quality of life. It has been hypothesized that changes in gut microbiota composition and function evoked by antibiotic use represent a trigger for IBS development. This systematic review and meta-analysis aims to assess the incidence of IBS following antibiotic use.

Methods: Medline, Embase, and Scopus, along with relevant conference abstracts and citation tracking were searched up to June 15th, 2025. Studies that reported new diagnoses of IBS in patients with documented antibiotic exposure versus controls without antibiotic exposure were included. Data extraction and quality assessment were performed independently by two reviewers. Pooled incidence rates per 1000 person-years, along with incidence rate ratios (IRRs) with 95% confidence intervals (CI) were pooled; heterogeneity was expressed as I^2. Meta-regression analysis was performed to assess the impact of confounding covariates.

Results: Thirty-one studies comprising a total of 422,350 patients (244,632 antibiotic users and 177,718 non-users) were included. The overall pooled incidence of IBS was 26% in antibiotic users compared to 20% in non-users, resulting in an IRR of 1.3 (95% CI: 1.07–1.58; p = 0.008). In sensitivity analyses including only studies in which antibiotics were used for gastrointestinal infections, the risk of developing IBS was higher for antibiotic users (IRR: 1.71; 95% CI: 1.16–2.51; p = 0.007), with high heterogeneity (I^2 > 90%) among studies. Meta-regression analysis showed that the geographical area where the study was carried out and criteria used for IBS diagnosis were associated with high heterogeneity.

Conclusion: Antibiotic use is associated with increased risk of developing IBS, especially following gastrointestinal infections. However, the significant study heterogeneity reduces the power of our results, suggesting that further high-quality research is needed to clarify this relationship.

Irritable bowel syndrome incidence rate ratio after antibiotic therapy

Study or Subgroup	Ab Events	Ab Total	Non Ab Events	Non Ab Total	Weight	Risk Ratio M-H, Random, 95% CI
Agnello 2020	1283	2058	409	758	5.2%	1.16 [1.07, 1.24]
Alqahtani 2022	31	126	274	1139	4.6%	1.02 [0.74, 1.41]
Berumen 2021	225	841	76	263	4.9%	0.93 [0.74, 1.15]
Chan 2023	15	96	49	437	3.7%	1.39 [0.82, 2.38]
Cremon 2014	3	176	71	3088	1.9%	0.74 [0.24, 2.33]
Jones 2021	3957	89678	369	19015	5.2%	2.27 [2.05, 2.53]
Kamphorst 2022	13	684	26	1356	3.3%	0.99 [0.51, 1.92]
Koloski 2015	52	10948	133	2091	4.6%	0.07 [0.05, 0.10]
Krajicek 2018	140	237	184	411	5.1%	1.32 [1.13, 1.53]
Kridin 2022	1919	75678	1074	75722	5.2%	1.79 [1.66, 1.93]
Krogsgaard 2018	155	595	379	2186	5.0%	1.50 [1.28, 1.77]
Lalani 2015	1	46	22	624	0.8%	0.62 [0.09, 4.47]
Lee 2013	21	2344	20	12127	3.5%	5.43 [2.95, 10.01]
Lenover 2024	52	1300	17	590	3.7%	1.39 [0.81, 2.38]
Liang 2020	6	78	64	832	2.8%	1.00 [0.45, 2.23]
Mendall 1998	31	139	17	283	3.7%	3.71 [2.13, 6.47]
Paula 2015	102	3553	163	2673	4.8%	0.47 [0.37, 0.60]
Peters 2021	39	49	9	14	4.2%	1.24 [0.82, 1.88]
Ruigomez 2007	197	2344	44	784	4.6%	1.50 [1.09, 2.06]
Salem 2019	21	21	19	42	4.5%	2.16 [1.54, 3.01]
Sharifi 2022	9	59	8	120	2.5%	2.29 [0.93, 5.63]
Soyturk 2007	10	97	0	2	0.5%	0.64 [0.05, 8.60]
Staller 2023	21801	99889	7310	64394	5.2%	1.92 [1.88, 1.97]
Stermer 2006	4	10	19	273	2.5%	5.75 [2.40, 13.78]
Tornblom 2007	10	225	31	1440	3.1%	2.06 [1.03, 4.15]
Vajravelu 2022	166	221553	151	221553	4.9%	1.10 [0.88, 1.37]
Total (95% CI)		**512824**		**412217**	**100.0%**	**1.30 [1.07, 1.58]**
Total events	30263		10938			

Heterogeneity: $Tau^2 = 0.19$; $Chi^2 = 818.72$, df = 25 ($P < 0.00001$); $I^2 = 97\%$

Test for overall effect: Z = 2.66 (P = 0.008)