Hennepin Healthcare

Objective

• Conduct a systematic review and meta-analysis to assess whether individuals with Down syndrome (DS) display a higher frequency of malocclusion compared to individuals without DS.

Methods

- A literature search of indexed databases (PubMed, Web of Science, Cochrane) was conducted without language restriction up to and including January 1, 2025. Cross-referencing was used to further identify articles.
- The eligibility criteria were observational studies with original data that statistically compared the prevalence of malocclusion between individuals with and without DS.
- Random effects meta-analysis through the Mantel-Haenszel estimator was used to evaluate the association between DS and malocclusion based on odds ratios (ORs) with 95% confidence intervals (CIs)

Figure 1: Forest plot between Down Syndrome and Control groups showing the prevalence of Anterior Crossbite.

0	own Synd	C	ontrol		Odds Ratio			
Study	Events	Total	Events	Total	Weight	MH, Random, 95%	CI	MH
Vigild 1985	15	37	9	1700	16.8%	128.11 [50.68; 323.8	30]	
Oreland 1987	4	22	0	22	10.0%	10.95 [0.55; 216.7	5]	
Cornejo 1996	9	86	3	86	15.6%	3.23 [0.84; 12.39	1	
Jaber 2010	8	60	2	60	14.7%	4.46 0.91; 21.97	i	
Baurer 2012	20	30	20	60	16.8%	4.00 [1.58; 10.13	i	
Andersson 2016	7	28	1	93	12.8%	30.67 [3.58; 262.8	1]	
Alessandri-Bonetti 202	23 26	72	1	75	13.2%	41.83 [5.49; 318.7	6]	
Total (95% CI)		335		2096	100.0%	13.79 [3.35; 56.8	3]	
Prediction interval						[0.12; 1579.70]	20 - S-	
Heterogeneity: Tau ² = 2.	8796; Chi ² =	39.04	, df = 6 (F	< 0.0°	1); l ² = 85 ⁰	%		
Test for overall effect: Z	= 3.63 (P <)	0.01)	0400 500		1210 - 2223		0.001	(

Figure 2: Forest plot between Down Syndrome and Control groups showing the prevalence of Class III Malocclusion.

	own Sync	0	Control		Odds Ratio		0	
Study	Events	Total	Events	Total	Weight	MH, Random, 95% CI		MH, Ra
Vigild 1985	20	37	68	1700	10.9%	28.24 [14.15; 56.33]		
Oreland 1987	3	22	1	22	2.6%	3.32 [0.32; 34.65]		
Vittek 1994	21	57	442	8841	12.4%	11.08 [6.42; 19.15]		
Cornejo 1996	60	86	10	86	9.8%	17.54 [7.85; 39.19]		
Oredugba 2007	20	43	2	43	4.9%	17.83 [3.82; 83.20]		
Jaber 2010	13	60	4	60	6.8%	3.87 [1.18; 12.68]		
Baurer 2012	17	30	2	60	4.7%	37.92 [7.78; 184.82]		
Al-Sarheed 2015	50	93	8	99	9.6%	13.23 [5.77; 30.33]		
Margues 2015	31	60	4	60	7.2%	14.97 [4.82; 46.50]		
Al-Khudhairy 2019	16	50	8	50	8.5%	2.47 [0.94; 6.46]		
Ghaith 2019	70	106	14	125	11.0%	15.42 [7.76; 30.61]		
Assery 2020	11	30	0	30	1.8%	35.97 [2.00; 645.93]		
Alessandri-Bonetti 202	23 41	72	11	75	10.0%	7.70 [3.49; 16.98]		
Total (95% CI)		746		11251	100.0%	11.75 [7.80; 17.69]		
Prediction interval						[3.40; 40.67]		
Heterogeneity: $Tau^2 = 0$.	2746; Chi ² :	= 26.74	. df = 12 (P < 0.0	1); $l^2 = 55$	%	1	1
Test for overall effect: Z	= 11.80 (P <	0.01)		9-11-10-17			0.01	0.1

A Systematic Review and Meta-Analysis Comparing the Prevalence of Dental

Malocclusions between Individuals w/and w/out Down Syndrome

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Results

- the meta-analysis.
- studies exhibited significant heterogeneity (P < 0.0001).

Conclusion

syndrome compared to individuals without Down syndrome.







Figure 3: Forest plot between Down Syndrome and Control groups showing the prevalence of Anterior Open Bite.

a	Experim	ental	C	ontrol		Odds Ratio		0	dds Rat	tio	
Study	Events	Total	Events	Total	Weight	MH, Random, 95% CI	3	MH, Ra	andom,	95% CI	
Vigild 1985	14	37	34	1700	12.5%	29.83 [14.14; 62.90]				-	-
Oreland 1987	7	22	0	22	4.0%	21.77 [1.16; 409.78]			-		_
Vittek 1994	3	57	212	8841	10.3%	2.26 [0.70; 7.29]			-	-	
Cornejo 1996	9	86	1	86	6.2%	9.94 [1.23; 80.23]			_	-	_
Jaber 2010	9	60	2	60	8.2%	5.12 [1.06; 24.79]				-	
Baurer 2012	5	30	2	60	7.7%	5.80 [1.05; 31.93]			-	-	÷.
Marques 2015	16	60	3	60	9.6%	6.91 [1.89; 25.21]			-	-	
Ghaith 2019	64	106	14	125	12.8%	12.08 [6.13; 23.81]				-	
Assery 2020	12	30	1	30	6.1%	19.33 [2.31; 161.57]				-	
Mohamed 2022	13	111	8	111	11.6%	1.71 [0.68; 4.30]			-	-	
Alessandri-Bonetti 2023	16	72	6	75	11.1%	3.29 [1.21; 8.95]			-		
Total (95% CI)		671		11170	100.0%	6.82 [3.44; 13.52]				+	
Prediction interval	10.012					[0.75; 62.09]	_		_		
Heterogeneity: Tau* = 0.83 Test for everall effect: 7 =	5 50 /P	33.80	, df = 10 (P < 0.01	1); $\Gamma = 70^{\circ}$	%	0.01			10	
rest for overall effect: $Z = 1$	0.00 (P C)	0.01)					0.01	0.1	1	10	1

Posterior Crossbite.

0	own Synd	wn Syndrome		Control		Odds Ratio	Odds Ratio				
Study	Events	Total	Events	Total	Weight	MH, Random, 95% CI	M	H, Rando	m, 95%	6 CI	
Vigild 1985	25	37	340	1700	21.5%	8.33 [4.14; 16.76]					
Oreland 1987	15	22	4	22	5.3%	9.64 [2.36; 39.36]					
Vittek 1994	8	57	124	8841	17.7%	11.48 [5.32; 24.74]					
Cornejo 1996	25	86	7	86	12.9%	4.63 [1.88; 11.40]			_		
Jaber 2010	19	60	6	60	10.4%	4.17 [1.53; 11.38]					
Baurer 2012	25	30	24	60	8.8%	7.50 [2.52; 22.31]			-	-	
Margues 2015	32	60	7	60	11.9%	8.65 [3.39; 22.09]				_	
Andersson 2016	6	28	3	93	4.9%	8.18 [1.90; 35.31]				-	
Alessandri-Bonetti 202	23 24	72	3	75	6.7%	12.00 [3.42; 42.08]				•	
Total (95% CI)		452		10997	100.0%	7.81 [5.65; 10.80]				+	
Prediction interval Heterogeneity: Tau ² = 0;	Chi ² = 4.49	. df = 8	(P = 0.81); l ² = 0	%	[5.29; 11.54]	r				
Test for overall effect: Z = 12.45 (P < 0.01)							0.1	0.5 1	2	10	



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• The literature search generated 154 records, and 21 full-text articles were reviewed. Sixteen studies comprising 12,639 individuals from 12 countries (Argentina, Brazil, Denmark, Italy, Jordan, Malaysia, Nigeria, Saudi Arabia, Sweden, United Arab Emirates, and USA) fulfilled our selection criteria and were included in

• The meta-analysis revealed statistically significant associations between DS and anterior crossbite (OR, 13.8; 95% CI, 3.4 to 56.9), Class III malocclusion (OR, 11.8; 95% CI, 7.8 to 17.7), anterior open bite (OR, 6.8; 95% Cl, 3.4 to 13.5), and posterior crossbite (OR, 7.8; 95% Cl, 5.7 to 10.8). The OR estimates of the reviewed

• Our findings suggest a higher prevalence of dental malocclusions in individuals born with Down

Figure 4: Forest plot between Down Syndrome and Control groups showing the prevalence of