References

Medical Co-Occurring Conditions in Children with Down Syndrome With and Without Autism Spectrum Disorder: A Retrospective Analysis from the Sie Center for Down Syndrome

Spinazzi et al., 2023

Hannah M. Rea*, Karin Carl*, Liz Maastricht, Sabrina Sargado, Nicole Baumer, Lina Patel, Shayleigh Page, Katherine Pawloski, Meghan O'Neill, Noemi Spinazzi

Background

- Children with Down Syndrome (DS) demonstrate elevated rates of neurodevelopmental diagnoses compared with the general population.[1,2]
- Co-occurring medical conditions in DS alone have been extensively characterized, yet evidence specific to those with co-occurring Autism Spectrum Disorder (ASD) remains limited.[2,3]
- Individuals with DS+ASD may show distinct patterns of medical co-occurrences compared with those with DS alone.[4]
- It is important to understand these co-occurring conditions to help guide clinicians in screening, diagnosing, and referring patients with DS+ASD for appropriate medical care.

Objectives

This study investigated the prevalence of medical conditions in children with DS + ASD compared to DS alone in a large clinical database.
The goal was to replicate and extend previous findings by Spinazzi and colleagues (2023).[4]

Methods

- Participants:
  - 3 to 22-year-olds with a diagnosis of DS
  - Seen at the Anna and John J. Sie Center for Down Syndrome (SCDS) between November 2010 and August 2025.
- Clinicians reviewed electronic medical records
- Of the 1,826 study participants, 196 patients had a clinician – confirmed diagnosis of ASD.

Co-occurring Conditions	DS+ASD (n=196)[a]	DS-only (n=1630)[a]	Odds Ratio	p value (95% CI)
Moderate to Late Preterm (32-36 weeks gestational age) (DS+ASD=182; DS=1605)	46 (25.3%)	410 (26.8%)	0.93	0.67 (0.65-1.32)
Extremely to Very Preterm (<28-31 weeks gestational age) (DS+ASD=182; DS=1605)	2 (1.1%)	43 (2.8%)	0.39	0.19 (0.09-1.60)
Any Neonatal Complications (DS+ASD=184; DS=1557)	167 (90.8%)	1341 (86.1%)	1.58	0.083 (0.94-2.66)
CHD with any surgery vs. CHD no surgery (DS+ASD=121; DS=999)	56 (46.3%)	530 (53.1%)	0.76	0.160 (0.52-1.11)
Constipation	118 (60.2%)	866 (53.1%)	1.34	0.061 (0.99-1.81)
Gastroesophageal Reflux Disease	78 (39.8%)	589 (36.1%)	1.17	0.315 (0.86-1.58)
Dysphagia (any type)	**64 (32.7%)**	**416 (25.5%)**	**1.42**	**0.033 (1.03-1.95)**
Duodenal Atresia/Stenosis	8 (4.1%)	87 (5.3%)	0.76	0.456 (0.36-1.58)
Hirschsprung's	2 (1.0%)	38 (2.3%)	0.43	0.250 (0.10-1.80)
GI Surgery (not including g-tube)[1]	28 (14.3%)	207 (12.7%)	1.15	0.531 (0.75-1.75)
Gastrostomy Tube (G-tube)	**38 (19.4%)**	**158 (9.7%)**	**1.79**	**0.003 (1.22-2.63)**
Thyroid Abnormalities	73 (37.2%)	598 (36.7%)	1.02	0.878 (0.75-1.39)
Celiac Disease	12 (6.1%)	98 (6.0%)	1.02	0.951 (0.55-1.89)
Type 1 Diabetes	1 (0.5%)	10 (0.6%)	0.83	0.860 (0.11-6.53)
Tonsillectomy and/or Adenoidectomy	126 (64.3%)	971 (59.6%)	1.22	0.203 (0.90-1.66)
Pressure Equalizing Tubes/Eustachian Tube Dysfunction	120 (61.2%)	890 (54.6%)	1.31	0.079 (0.97-1.78)
Other ENT Surgery	106 (54.1%)	840 (51.5%)	1.11	0.500 (0.82-1.49)
Hearing Loss	97 (49.5%)	724 (44.4%)	1.23	0.178 (0.91-1.65)
Hearing Device	**38 (19.4%)**	**171 (10.5%)**	**2.05**	**<.001 (1.39-3.03)**
Obstructive Sleep Apnea	116 (59.2%)	939 (57.6%)	1.07	0.673 (0.79-1.44)
Scoliosis	**11 (5.6%)**	**45 (2.8%)**	**2.09**	**0.032 (1.07-4.12)**
Hip Anomaly	**13 (6.6%)**	**48 (2.9%)**	**2.34**	**0.008 (1.25-4.40)**
Seizures/Epilepsy (No infantile spasms)	**18 (9.2%)**	**76 (4.7%)**	**2.07**	**0.008 (1.21-3.54)**
Infantile Spasms (+/- other seizure types later)	**13 (6.6%)**	**24 (1.5%)**	**4.75**	**<.001 (2.38-9.50)**
Anemia	37 (18.9%)	346 (21.2%)	0.86	0.445 (0.59-1.26)
Vision/Eye Diagnosis	**176 (89.8%)**	**1349 (82.8%)**	**1.83**	**0.013 (1.13-2.96)**
Asthma/Reactive Airway Disease	32 (16.3%)	239 (14.6%)	1.14	0.536 (0.76-1.70)
Chronic Lung Disease	**21 (10.7%)**	**109 (6.7%)**	**1.73**	**0.049 (1.00-2.97)**
Tracheomalacia/Bronchomalacia	**17 (8.7%)**	**85 (5.2%)**	**1.67**	**0.040 (1.02-2.74)**
Leukemia Diagnosis	4 (2.0%)	33 (2.0%)	1.01	0.988 (0.35-2.88)

[1]e.g., Duodenal related, Nissen Fundoplication, Colostomy, Laparotomy, etc.; Light Green=Statistically Significant; Dark Green=Survived Benjamini Hochberg correction

	Significant in Spinazzi et al., 2023 (n=562)	Significant in Current Study (n=1,826)
Congenital Heart Defect	☑	☒
Constipation	☑	☒
GERD	☑	☒
Dysphagia	☒	☑
G-tube	☒	☑
Hearing Device	☒	☑
Vision/Eye Diagnosis	☒	☑
Hip Anomaly	Not Investigated	☑
Chronic Lung Disease	Not Investigated	☑
Tracheomalacia/ Bronchomalacia	Not Investigated	☑
Scoliosis	☑	☑
Infantile Spasms	☑	☑
Seizures/Epilepsy (other than Infantile Spasms)	☑	☑

Discussion:

- In a sample that was about 3 times larger than Spinazzi et al. (2023), findings of higher rates of scoliosis, infantile spasms, and seizures in DS+ASD were replicated
- Even comparisons that did not survive Benjamini Hochberg correction had small to large effect sizes, suggesting likely clinically meaningful heightened risks for the DS+ASD group
- Strengths: using a large data set from an established Down Syndrome program, data provided by clinicians with expertise in DS
  Limitations: Data collection strategies differed between studies

Recommendations

- Continue to consider understanding co-occurring medical diagnosis for children and adolescents with DS+ASD.
  - For example, given the variety of feeding challenges associated with DS and ASD, future research should clarify specific feeding concerns in DS+ASD
- Future studies should focus on the replicated findings of an added musculoskeletal and feeding difficulty diagnosis and should consider how to overcome the current limitations of clinic-based, retrospective data collection.
- Centers should harmonize definitions for medical, psychiatric, and neurodevelopmental conditions to create larger cohorts that may allow for better characterization of DS and DS+ASD

Acknowledgements

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References

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