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Is ABO Blood Group a Risk Factor for Adolescent Idiopathic Scoliosis?

Evidence from a Case–Control Study of Surgically Treated Patients

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Background

- Adolescent Idiopathic Scoliosis (AIS) is a complex 3D spinal deformity
- Affects approximately 1–3% of adolescents (aged 10–16 years) worldwide
- Etiology remains poorly understood and is considered multifactorial, involving genetic, hormonal, and environmental factors
- Previous studies show high concordance in monozygotic twins and familial clustering

The ABO Blood Group System

- The ABO system is the most extensively studied genetic marker in human populations
- It is linked to susceptibility in cardiovascular diseases, gastric/pancreatic cancers, and autoimmune conditions
- ABO genes encode glycosyltransferase enzymes that influence cell adhesion, immune modulation, and tissue remodeling—processes relevant to spinal development

Objective

• To evaluate the association between ABO blood group types and the risk of AIS in surgically treated patients

• Determine if a statistically significant relationship exists between specific blood groups and AIS occurrence compared to healthy controls

Material and Methods

- **Study Design:** Retrospective case-control study (August 2015 – December 2022)
- **Case Group (n=133):** AIS patients (40 males and 93 females) aged 10–20 years who underwent surgical correction
- **Control Group (n=140):** Age- and sex-matched healthy individuals without spinal deformity
- **Inclusion Criteria:** Cobb's angle >45° for cases
- **Statistical Tool:** Pearson's chi-square test

Result- Gender Distribution

- **AIS Group:** 69.92% Female (n=93), 30.07% Male (n=40)
- **Control Group:** 63.57% Female (n=89), 36.42% Male (n=51)
- **Statistical Significance:** No significant difference in gender distribution between groups (**p = 0.266**)

Result: ABO Blood Group Distribution

Blood Group	AIS (n=133)	Control (n=140)
A+	24.81% (n=33)	25.00% (n=35)
B+	28.57% (n=38)	33.57% (n=47)
AB+	10.52% (n=14)	10.71% (n=15)
O+	**32.33% (n=43)**	27.85% (n=39)
Negative	3.75% (n=5)	2.85% (n=4)

- **P-value: 0.882**
- While O+ was slightly more frequent in AIS cases, the difference was not statistically significant

Discussion

- Some studies (Zhichong Wu et al., Khanshour et al.) found associations between ABO genetic variants and AIS in specific populations

- Others (Tanchev et al.) found no correlation with blood group affiliation

- Any influence of the ABO system on AIS is likely subtle and dependent on complex genetic interactions rather than direct blood group phenotypes

Limitations

- **Retrospective Design:** Reliance on medical records
- **Sample Size:** Modest size may limit detection of small differences in rare groups like AB
- **Selection Bias:** Included only severe (surgical) cases; milder cases (bracing/observation) were not represented
- **Phenotype vs. Genotype:** Study examined blood types, not underlying genetic variations of the ABO gene

Conclusion

- There is **no significant association** between ABO blood group types and the risk of AIS in surgically treated patients

- Larger multicentric studies covering the full clinical spectrum of AIS are recommended to further explore genetic correlation