

IS THERE A DIFFERENCE IN SEMEN QUALITY BETWEEN SICKLE TRAIT CARRIERS AND NON-CARRIERS?

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Objective

Sickle cell disease (SCD) is an inherited hemoglobin disorder that causes red blood cell sickling and systemic complications including impaired semen parameters.¹ While individuals with sickle cell trait (SCT) are typically asymptomatic, its effect on male fertility remains unclear. This study evaluates the association between SCT and semen quality.

Design

Retrospective cohort study

Materials & Methods

- This study included male patients with SCT presenting for evaluation at a single academic fertility center between 2007 and 2025.
- Patients with SCT were compared with directed sperm donors (DSD) and an age matched cohort from the general infertile population; individuals with abnormal hemoglobin electrophoresis were excluded from comparison groups.
- The primary outcome was total sperm count (millions).
- Secondary outcomes included semen volume (mL), motility (%), and Kruger morphology (%).
- Group comparisons were performed using chi-square and Kruskal-Wallis tests.
- Multivariable logistic regression adjusting for age, abstinence days, and year of analysis assessed the association between SCT and semen quality with two-sided $p < 0.05$ considered significant.

Results

Table 1. Semen Analysis Parameters

	SCT (n=136)	General Infertile Population (n=408)	DSD (n=109)	p-value
Volume (ml)	2.6 (1.5-3.7)	2.5 (1.8-3.6)	2.7 (1.8-4.0)	0.78
Total Sperm Count (millions)	114.5 (39.4-217.5)	148.1 (74.3-239.0)	147.6 (54.0-256.2)	0.02
Motility (%)	60.0 (46.0-69.5)	60.0 (50.5-69.0)	65.0 (54.0-72.0)	0.13
Morphology (%)	3.0 (1.5-5.0)	4.0 (3.0-5.0)	4.0 (2.0-5.0)	0.01

Results written as median (IQR) for non-parametric variables

Table 2. Odds Ratio of Abnormal Semen Parameters

	SCT	OR (95% CI)	General Infertile Population	OR (95% CI)	DSD	OR (95% CI)
Abnormal Volume	20.0 (14.7)	0.81 (0.41-1.63)	67.0 (16.4)	0.92 (0.52-1.62)	19.0 (17.4)	Ref
Abnormal Total Sperm Count	33.0 (24.3)	1.42 (0.76-2.67)	48.0 (11.8)	0.58 (0.33-1.05)	20.0 (18.4)	Ref
Abnormal Motility	13.0 (9.6)	3.49 (0.96-12.7)	10.0 (2.5)	0.89 (0.24-3.29)	3.0 (2.8)	Ref
Abnormal Morphology	72.0 (52.9)	1.34 (0.80-2.23)	147.0 (36.0)	0.70 (0.45-1.07)	49.0 (45.0)	Ref

- Median (IQR) age differed significantly across groups (SCT: 44.8 [39.8–49.0], general infertility: 44.9 [39.8–49.0], DSD: 36.8 [34.0–41.6]; $p < 0.0001$), a difference driven by the younger DSD cohort.
- Median ejaculatory abstinence duration was similar between groups (3 days).
- On unadjusted analyses, total sperm count and morphology differed across groups, while volume and motility were similar (Table 1).
- After multivariable adjustment, these differences did not persist, and the proportion of patients with abnormal volume, total sperm count, motility, or morphology was similar among SCT, general infertility, and DSD groups (Table 2).

Conclusions

- In this retrospective, fertility-seeking population, SCT was not independently associated with impaired semen parameters.
- Differences observed on unadjusted analyses were attenuated after accounting for confounders.
- These findings support counseling that SCT alone does not appear to adversely impact semen quality.