Female Students Reported Greater Side Effects After Receiving the COVID-19 Vaccine at Liberty University

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Background

- COVID-19 vaccine administered to millions of Americans.
- Concerns about safety & side effects.
- More severe side effects were reported in certain populations than others.
- Although clinical trials evaluated Moderna & Pfizer vaccines, there is limited research on the self-reported symptoms in young adult university-age students.

Research Question

- **Study aim**: to assess self-reported side effects & sex-based differences among students who received the COVID-19 vaccination.

Methods

- We conducted a cross-sectional study in a group of young adults (18-25 y) at Liberty University comparing prevalence & severity of side effects from the COVID-19 vaccine.
- After presenting CDC vaccine passport/ card to confirm full vaccination (Moderna or Pfizer), participants were asked to complete an in-person survey assessing COVID-19 vaccine side effects.
- Survey items included arm soreness, fever, headache, chills, muscle pain, fatigue, & nausea & vomiting.
- Questions evaluated self-reported severity, duration & dose.
- All analyses were conducted in SPSS 28.

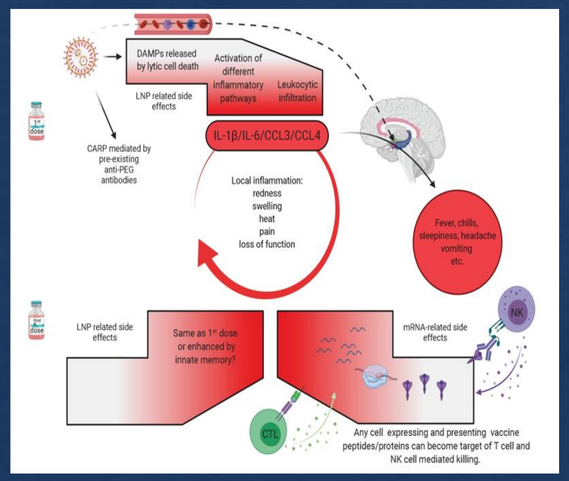

Fig 1: Potential Mechanism of Side Effects of SARS-CoV-2 Vaccines Source: Research looks at inflammatory nature of lipid nanoparticle component in mRNA vaccines (news-medical.net)

Results

- There were 103 university students (mean age 21.7 ± 2.1 y) in the final analysis.
- Most prevalent & severe symptoms: arm soreness (90%), chills (50%), muscle pain (67%), headache (50%), & tiredness (75%).
- Majority reported worse side effects for a longer period after first dose.
- No differences were found among racial groups.
- Female students (59%) reported significantly > severe headaches (41%), controlling for age / other common conditions, including allergies & hay fever (p=0.037; 95% C.I. 0.000, 0.140) & greater symptoms after 1st dose (p=0.004; C.I. 0.009, 0.193).

Table 1: Descriptive statistics (N=103).

Demographics		
Age (m, SD)		21.7 ± 2.1
Vaccine (n,%)		
	Pfizer	72 (69.9%)
	Moderna	31 (30.1%)
Sex:	Female	61 (59.2%)
Race:	White	65 (63.1%
	Asian	19 (18.4%)
	Black	11 (10.7)
	Hispanic	7 (6.8%)
Work Status		
	Full-Time Student-Only	46 (44.7%)
	Work Full-Time	19 (18.4%)
	Work Part-Time	38 (36.9%)
Marital Status		
	Single	98 (95.1%)
	Married	5 (4.9%)

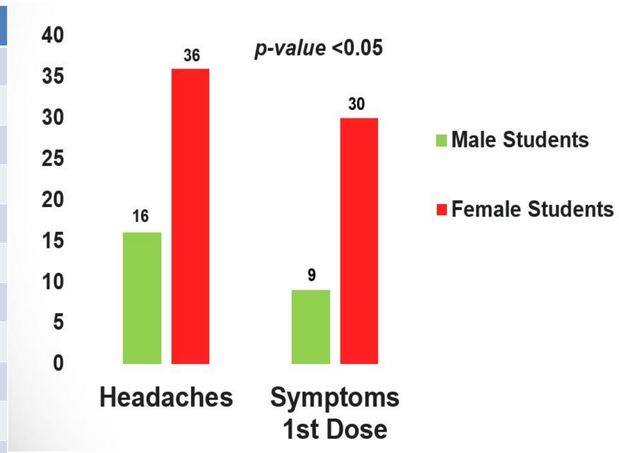

Figure 2. Female students reported more headaches overall (p=0.037; 95% C.I. 0.000, 0.140) & greater symptoms after 1st dose (p=0.004; C.I. 0.009, 0.193).

Table 2: Side Effects of COVID-19 Vaccine between male and female students.

Reported Side Effects	Male Students (n=42)	Female Students (n=61)
Arm:		
Swelling n(%)	15 (35.7%)	18 (29.5%)
Redness	11 (26.1%)	17 (27.8%)
Soreness	37 (88%)	56 (91.8%)
Fever	13 (31%)	24 (39.3%)
Headaches*	16 (38%)	36 (59%)
Chills	18 (42.9%)	32 (52.5%)
Muscle Pain	26 (61.9%)	42 (68.9%)
Joint Pain	9 (21.4%)	8 (13.1%)
Tiredness/Fatigue	29 (69%)	50 (82%)
Nausea/Vomiting	4 (9.5%)	5 (8.2%)
Swollen Lymph Nodes	4 (9.5%)	5 (8.2%)

*Denotes statistically significant difference based on p-value <0.05.

Discussion / Conclusion

Discussion

- Previous studies in diverse populations also found that young adult female patients reported a greater symptom-load from vaccines than male patients.
- Female sex-hormones are believed to play a role in eliciting a higher antibody response to vaccine based on antibody titer levels in laboratory studies.
- Some researchers suggest that a lower-dose vaccine may benefit young women and be equally effective as a high-dose vaccine in other populations.

Limitations

- This study was based on self-reported symptoms. No bloodwork was evaluated to determine antibody levels/ response to the vaccines.
- This was also a cross-sectional study and therefore is not able to establish temporality or determine how symptom reporting may have varied day by day.

Conclusion

- Female students reported greater headaches & overall side effects from the COVID-19 vaccine.

Recommendations and Future Work

- More research is needed to evaluate differences in immune response and social determinants of health that may influence reported side effects.
- Previous research points to a tendency for female patients and younger adult patients to elicit a stronger antibody response to vaccines compared to older adults and male patients.
- More research is needed to evaluate dosage based on factors such as sex or age.

Acknowledgments

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