The In Vitro Effects of Niacin on Platelet Aggregation when added to Aspirin in Normal Volunteers

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Background and Rational

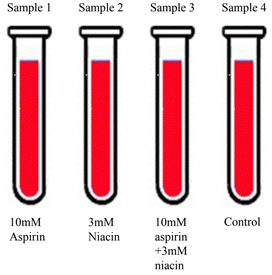
- A poor pharmacodynamic response to aspirin has been associated with adverse clinical outcomes in patients with cardiovascular disease. This has inspired clinical investigation into the use of alternative and/or adjunct agents to intensify platelet inhibition.
- Niacin is a dyslipidemia agent used to raise high-density lipoprotein (HDL) cholesterol levels. Recent evidence suggests that niacin may inhibit platelet thromboxane A2 production and directly inhibit platelet reactivity. Therefore, it may work synergistically with aspirin and could be used to improve the aspirin response among patients who are resistant.
- The objective of this study was to test whether niacin increases platelet inhibition when added to aspirin.

Specific Aims

- Compare the change in platelet reactivity when niacin and aspirin are added to whole blood.
- Determine the change in platelet reactivity when niacin is combined with aspirin.

Research Methods

- 4 tubes of Blood samples were collected from 7 healthy volunteers ≥ age 18



- Arachidonic acid (AA) and collagen-induced platelet aggregation were measured using the whole blood impedence aggregometer
- A paired T-test was used for comparison of platelet aggregation

Results

Collagen-Induced Platelet Aggregation (Ohms)			
Control	Aspirin	Niacin	Aspirin + Niacin
13.19 ± 2.67	5.25 ± 2.38	11.51 ± 2.63	3.25 ± 4.90
Arachidonic Acid-Induced Platelet Aggregation (Ohms)			
Control	Aspirin	Niacin	Aspirin + Niacin
4.59 ± 3.68	0	2.18 ± 3.26	0

Table 1. Collagen and arachidonic acid-induced platelet aggregation (Mean ± 1 SD).

Results

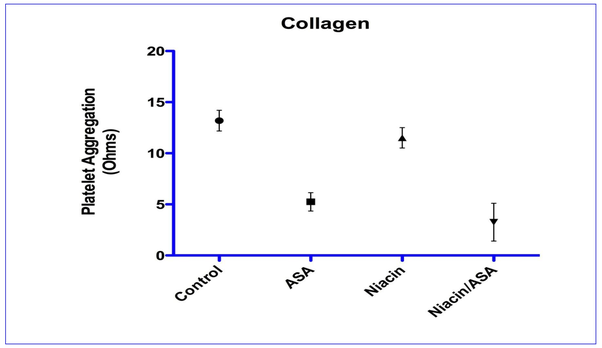


Figure 1. Collagen-induced platelet aggregation in vitro, using data from 7 volunteers

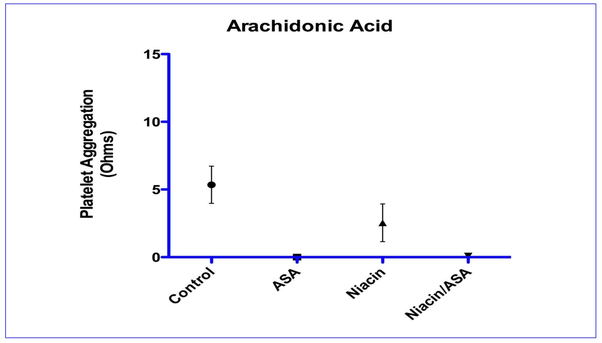


Figure 2. Arachidonic acid-induced platelet aggregation in vitro, using data from 7 volunteers

	Niacin	Aspirin	Niacin/Aspirin
Absolute reduction	1.7, (0.52 to 2.8)	7.9, (5.8 to 10.0)	9.9, (6.2 to 13.7)
Relative reduction	12.7%	60.2%	78%

Table 2. Degree of platelet inhibition (mean; 95% CI) of collagen-induced platelet aggregation induced by niacin, aspirin, and niacin + aspirin.

- Aspirin significantly inhibited both collagen and AA induced platelet aggregation compared to control
- Niacin produced a small but significant reduction in both collagen (12.7%, p = 0.012) and AA induced platelet aggregation (47.5%, p = 0.046) compared to control
- Aspirin generated a significantly higher degree of platelet inhibition compared to niacin (p = 0.0004)
- The combination of niacin + aspirin produced the greatest degree of platelet inhibition, but it did not differ significantly with the inhibition of collagen or AA induced platelet aggregation produced by aspirin alone (p = 0.221 and p = 0.356, respectively)

Conclusions

- This study showed that niacin alone had a small, direct inhibitory effect on platelet aggregation but did not increase platelet inhibition when added to aspirin.
- The strong baseline platelet inhibition from aspirin may have limited the magnitude of niacin's antiplatelet effects when the 2 drugs were combined.
- Niacin effects on platelet aggregation in combination with aspirin may be more evident in a population of patients that are aspirin-resistant. Further study is needed.

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