The Effects of a High Fat Meal on Blood Flow Regulation during Arm Exercise

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THE EFFECTS OF A HIGH FAT MEAL ON BLOOD FLOW REGULATION DURING ARM EXERCISE
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ABSTRACT

Purpose: This study sought to examine the impact of a single high saturated fat meal (HFM) on peripheral vascular function during an acute upper limb exercise bout.

Methods: Ten young healthy individuals completed two sessions of progressive handgrip exercise. Subjects either consumed a HFM (0.84 g of fat/kg of body weight) 4 hours prior or remained fasted before the exercise bout. Progressive rhythmic handgrip exercise (6kg, 12kg) was performed for 3 minutes per stage at a rate of 1 Hz. The brachial artery (BA) diameter and blood velocity was obtained using Doppler Ultrasound (GE Logiq e) and BA blood flow was calculated with these values.

Results: BA flow mediated dilation (normalized for shear rate), blood flow, and arm vascular conductance during the handgrip exercise significantly increased from baseline in all workloads, but no differences were revealed in response to the HFM consumption.

Conclusion: Progressive handgrip exercise augmented BA blood flow and flow mediated dilation in both testing days; however, there was no significant differences following the HFM consumption. This suggests that upper limb blood flow regulation during exercise is unaltered by a high fat meal in young healthy individuals.

RESULTS

Subject Characteristics (n = 10) Mean ± SEM

<table>
<thead>
<tr>
<th></th>
<th>Mean ± SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>22 ± 1</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>171 ± 3</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>65 ± 3</td>
</tr>
<tr>
<td>Body Mass Index (kg/m²)</td>
<td>22 ± 1</td>
</tr>
<tr>
<td>Body Fat (%)</td>
<td>15 ± 3</td>
</tr>
</tbody>
</table>

CONCLUSIONS

Prior high fat meal studies have revealed substantial vascular dysfunction up to 4 hours after consumption.

This study revealed that macrovascular function, evaluated as brachial artery flow-mediated dilation normalized for steady state shear rate values, was unaltered following the HFM when evaluated during small muscle mass exercise.

Additionally, examination of the BA blood flow response to exercise revealed no alterations after consumption of the HFM.

It was also revealed that microvascular function, evaluated via arm vascular conductance (BA blood flow/MAP) was not impacted by the HFM.

Therefore, this study revealed that after an acute HFM, macrovascular and microvascular function during exercise is maintained in young, healthy individuals.

Figure 1: Brachial artery dilation (normalized for shear rate stimulus) (Panel A), arm vascular conductance (Panel B), blood flow (Panel C), and mean arterial pressure (Panel D) at rest and during progressive handgrip exercise following an acute high fat meal consumption. [Mean ± SEM, * - significantly different from rest (p < 0.05)].