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The effect of whole and ground flaxseed on glycaemic and insulinaemic response

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Flaxseed has become the focus of many studies as a functional food due to its potential health benefits, especially in disease prevention.⁽¹⁾ Flaxseed is considered to be one of the richest plant sources of lignin, which can lower the risk of cardiovascular disease as well as inhibit the development of type 2 diabetes.⁽²⁾ Flaxseed also contains fibre which plays a key role in lowering postprandial blood glucose levels.⁽³⁾ The aim of this study was to determine the effect of whole and ground flaxseed on glycaemic response (GR), insulinaemic response (IR) and satiety.

In a randomized cross-over design, 32 healthy volunteers (21 female, 11 male; age 29 SD 5.8 years) consumed three different muffins (control, whole flaxseed and ground flaxseed) and the effects on GR and IR were measured over 2-hours using capillary blood samples. Participants' subjective feelings of satiety/hunger were also recorded on seven-point hedonic scales.

Table 1 Incremental area under the curve (iAUC) for glucose, insulin and satiety for each muffin

iAUC		Control		Whole flaxseed		Ground flaxseed		P-value
		Mean	SD	Mean	SD	Mean	SD	
Glucose (mmol.min/l)	iAUC 60	76.6	30.7	60.0	30.4	57.5	25.0	0.937
	iAUC 90	106.5	43.6	77.5 ^a	44.9	76.3 ^b	42.2	<0.001
	iAUC 120	126.4	53.0	87.4 ^a	50.0	90.0 ^b	54.5	<0.001
Insulin (µUmin/ml)	iAUC 60	2921.2	1514.3	2094.2 ^a	1184.9	1890.2 ^b	1365.8	<0.001
	iAUC 90	4023.2	2150.7	2629.0 ^a	1363.3	2394.4 ^b	1417.3	<0.001
	iAUC 120	4767.0	2545.0	3062.9 ^a	1625.0	2873.2 ^b	1809.7	<0.001
Satiety (mm*h)	iAUC 60	261.8	46.0	277.2	34.8	269.5	45.4	0.625
	iAUC 90	378.9	61.8	407.6	61.5	394.0	80.1	0.527
	iAUC 120	482.1	82.4	524.2	90.5	499.5	118.5	0.414

^a Significant difference between whole flaxseed muffin and control muffin ($P < 0.05$).

^b Significant difference between ground flaxseed muffin and control muffin ($P < 0.05$).

The results for the iAUC for glucose and insulin showed that both the whole and ground flaxseed muffins significantly lowered GR and IR compared to the control muffins at 60, 90 and 120 min ($P < 0.001$); however, there were no significant differences between the two flaxseed muffins ($P < 0.05$). The results for the iAUC for satiety showed that at 60, 90 and 120 min post consumption there was not significantly different ($P > 0.05$) between the types of muffins; however, whole flaxseed muffins had the highest iAUC results compared to the control and ground flaxseed muffins. Overall, the results of this study highlight the importance of investigating the addition of flaxseed in different forms to bakery products, in terms of GR and IR and satiety.

In conclusion, there is a limited amount of literature on the effect of flaxseed on GR and IR among healthy individuals. Most flaxseed-based studies have focused on hyperlipidaemic or diabetic patients, but the results of this study suggest there may be benefits to encouraging consumption of flaxseed among healthy individuals. This demonstrates the potential for flaxseed to improve GR and IR control in healthy individuals.

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