Does Active Nutritional Interventions Affect Adipokine Secretion in Hip Fracture Operated Elderly Patients?

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Background

- **Hip fractures are a significant health risk of the elderly population**
- **Approximately 50% of elderly hip fractured patients are malnourished on admission to the hospital and numerous others appear so after hospitalization**
- **Nutritional status and poor intake influence the prognosis of hip fracture patients**
- **Evidence has shown a positive effect of active nutritional interventions in acute settings including hip fractured patients**

The tight calorie control study (TICACOS)

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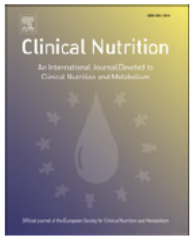

Randomized control trials

Tight Calorie Control in geriatric patients following hip fracture decreases complications: A randomized, controlled study☆

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Background: Adipokines

- **Adipokines such as ghrelin, leptin, resistin and adiponectin are cytokines secreted by the adipose tissue**
- **Adipokines play a role in the energy balance via dual effects on food intake and energy expenditure**
- **Several adipokines seem to play a role in bone remodeling and respond to inflammatory states**

Table 1. Adipokines and other soluble mediators [97–112].

Mediator	Effect
Adiponectin	Insulin-sensitizing properties
	Anti-inflammatory properties
	Hypoadiponectinemia associated with NASH
Leptin	Pro-inflammatory properties on innate and adaptive immunity
	Anorexigenic effects
	Antilipogenic effects in the liver
	Insulin resistance in obesity
	Susceptibility to autoimmune and infectious diseases
Ghrelin	Orexigenic action
	Anti-oxidant effect
	Anti-inflammatory effect
	Reduced levels in NAFLD
Resistin	Favours insulin resistance
	Interferes with oxidative stress
	Stimulates cytokine release
	Correlation with NAFLD severity and NASH development

Immunological Mechanisms in the Pathophysiology of Non-Alcoholic Steatohepatitis
Luisa Vonghia, Peter Michielsenand Sven Francque *Int. J. Mol. Sci.* **2013**

Aim

- **To explore the impact of active nutritional interventions on adipokine (ghrelin, leptin, resistin and adiponectin) secretion in hip fractured operated elderly patients and their relationship to nutritional balance and clinical complications.**

Methods

- **Randomized controlled study.**
- **Days 1,3,and 7 post op adipokine (ghrelin, leptin, resistin and adiponectin) levels in hip fractured geriatric patients.**
- **Patients receiving active nutritional support (**tight calorie group) **vs standard nutritional support**
- **The tight calorie group consumed calories with an energy goal determined by repeated REE measurements using indirect calorimetry**

Methods

Inclusion

- **> 65 years**
- **<48h after hip fracture**
- **Surgery was treatment of choice**

Exclusion

- **Steroids or immunosuppression therapy**
- **Active oncologic disease**
- **Multiple fractures, dementia.**
- **Patients in need of supplemental oxygen**

Results

Baseline characteristics of study participants

Variable	Study Group (n= 22)	Control Group(n=28)	p-value
Age (yrs)	82.27±6.06	83.75±6.43	0.876
Gender Male n (%) Female n (%)	 6 (27.3%) 16 (72.7%)	 11 (39.3%) 17 (60.7%)	 0.318
Weight (kg)	64.81 ± 9.52	64.29 ± 11.35	0.86
BMI (kg/m^2)	25.18±3.19	24.67±4.42	0.653
Mean serum albumin (mg/dl)	3.23±0.34	3.13±0.27	0.282
Mean blood glucose (mg/dl)	121.54±22.52	118.17±21.09	0.589
MNA	24.84±2.57	24.50±2.97	0.672
CCI	0.81±1.05	1.39±1.13	0.073
CIRS-G	7.45±3.59	7.39±2.60	0.944
FIM	80.00±17.62	79.1±17.17	0.863
MMSE	25.16±4.86	23.72±5.19	0.375

Data are expressed as mean ± standard deviation. Abbreviations: BMI, body mass index;; MNA, mini-nutritional assessement; CCI, Charlson's comorbidity index; CIRS-G, Cumulative Illness Rating Scale for Geriatrics;
FIM, Functional Independence Measure; MMSE, Mini-Mental State Examination.

Results

Table 1. Nutritional and Energetic Balance

Parameter	Study group (n=22)	Control group (n=28)	P-value
Mean energy delivered/day (kcal/day)	1121.31±299.05	777.09±301.23	0.001
Mean ONS delivered energy/day (kcal/day)	220.33±147.19	94.57±233.82[a]	0.845
Mean protein delivered/day (g/day)	55.90±18.14	37.41±12.44	0.001
Mean daily energy balance (kcal)	-176.90±273.16	-490.67±355.17	0.104
Cumulative energy balance (kcal)	-1229.93±1763	-4975.55±4368	0.001

[a]Included 1 patient who required mechanical ventilation and received 1500kcal/day via tube-feeding.
Data are expressed as mean ± standard deviation.
REE, resting energy expenditure; kcal, kilocalories; ONS, oral nutritional supplements

Results

Table 2. Adipokine Levels Pre Operation, 48h Post Operation and on the 7th Day

	Study Group				Control Group				P value between groups
	N	Pre-Operation	48h Post Operation	7th day of the study	N	Pre-Operation	48h Post Operation	7th day of the study	
Ghrelin (pg/ml)	21	925.3±373.5	1061.3±570.2	1249.7±691.6	27	919.5±551	955.3±607.4	1031.1±685.9	N.S.[a]
Leptin (pg/ml)	22	16601±9814	8291±4812[b]	10801±7511	27	15754±11084	12390±10081[b]	10123±7990	N.S.
Resistin (ng/ml)	21	19.3±7.8	19.0±7.87	19.2±7.6	28	12.8±3.9	14.3±4.2	14.6±5.3	N.S.
Adiponectin (µg/ml)	21	9127±7481	4050±1993	5970±2301	26	10736±8711	6042±4310	7601±5149	N.S.[c]

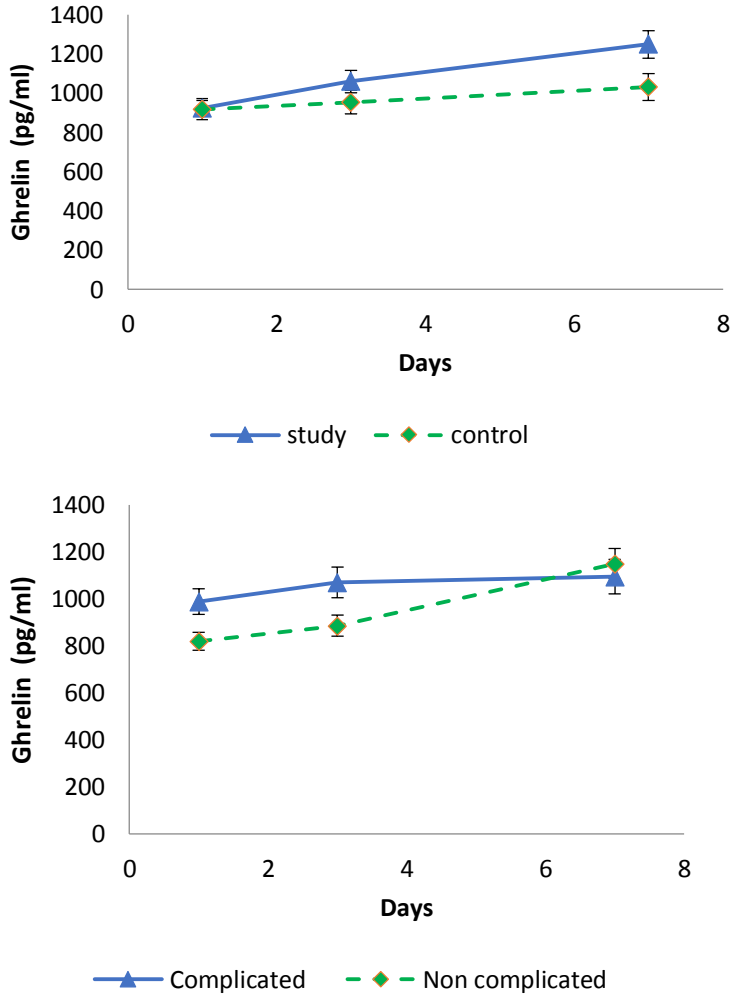
Table 2. Adipokine Levels Pre Operation, 48h Post Operation and on the 7th Day
[a]Significant increase ($p < 0.04$) in serum Ghrelin levels from day 1 to day 7 in both study and control groups
[b]Significant change between the study and control group after 48h ($p=0.038$)
[c]Significant decrease ($p < 0.001$) in serum adiponectin levels from day 1 to day 7 in both study and control groups
N.S.- non significant

Discussion

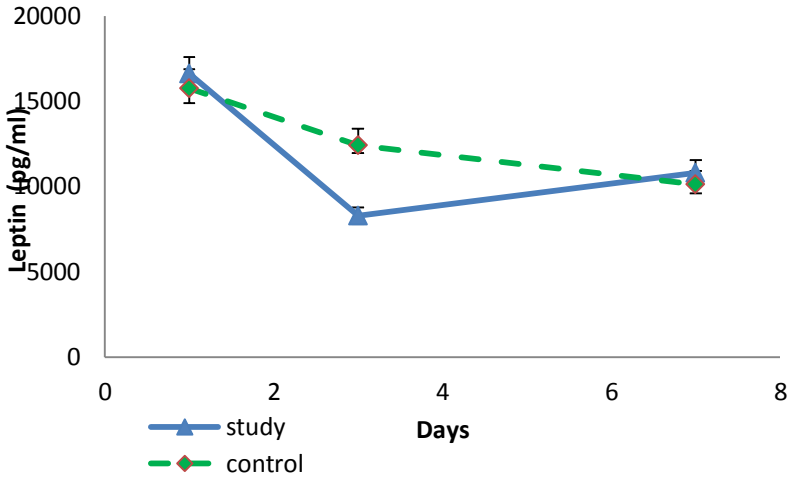
- **Overall, the adipokine kinetics levels did not significantly differ between the study groups.**
- **However, it seems that the adipokines ghrelin and leptin may be influenced from energetic balance.**

Discussion- Ghrelin

- **Ghrelin role in osteoblastic proliferation may explain the elevation in both study groups.**
- **Surprisingly Ghrelin levels were significantly lower in patients with complications during hospitalization**
  - ➢ **lower response of the immune system to acute stress?**
  - ➢ **mild complication?**
  - ➢ **better osteoblastic proliferation?**

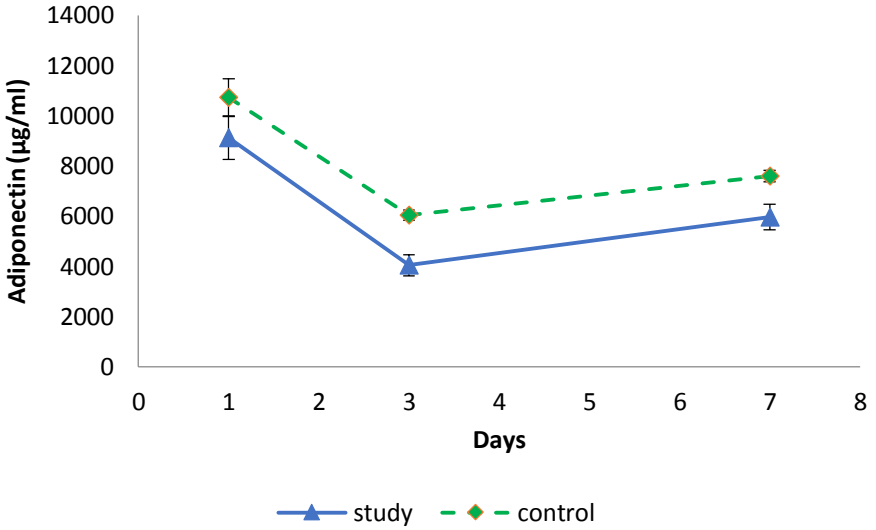


Discussion- Leptin



- **Several studies suggest a negative feedback control of leptin on bone remodeling.**
- **May explain the decline in both groups**
- **Lower acute inflammatory response in the intervention group or faster bone remodeling?**
- **Elevation in the intervention group may suggest leptin's role in the body's energetic homeostasis**

Discussion- Adiponectin



- **The finding support adiponectin's biphasic behavior theory, in response to acute stress.**
- **The short duration of the decline and the absence of change between the groups, suggests that adiponectin has no significant role in bone homeostasis or energetic balance in elderly patients post hip fracture.**

Limitation

- **Short duration and relatively small sample base.**
- **No post discharge FU.**
- **Relatively good nutritional status of the study participants.**

Conclusion

- **We found no correlation between improved energy balance in geriatric hip fractured patients and adipokine levels.**
- **Several changes in adipokine behaviors were observed.**
- **Differences may be the results of adipokine involvement in bone homeostasis and inflammatory states.**
- **A larger scale research study is needed to expand our knowledge of these fascinating cytokines and their interactions with nutritional support.**

I am ready for Questions

☺