SILICON BREAST IMPLANT EFFECTS ON BODY COMPOSITION AND BONE MINERAL DENSITY VALUES BY DEXA SCAN

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BACKGROUND & SIGNIFICANCE

- Silicone implants are surgically installed for a variety of reasons.
- Some individuals do this for cosmetic reasons and others for reconstruction. This can be due to cancer and chemotherapy is a frequent adjunctive therapy which can negatively effect bone mineral density (shown to decrease by 10% and increase onset of osteoporosis by 10 years in premenopausal breast cancer).
- In double mastectomy patients, complete reconstruction can occur frequently with implants (59% and greater in some contexts). Typically, these implants are silicone filled.
- These implants can add or replace mass typically in female populations.
- However, how this mass is measured is important, specifically when it comes to the identification of osteopenia and osteoporosis.

PURPOSE

- To analyze the differences in body composition from the addition of implants.

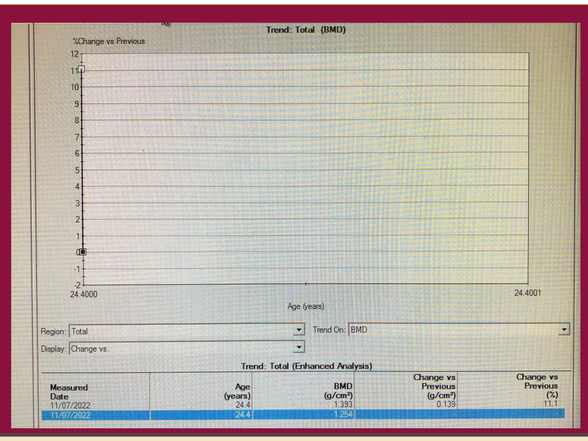
METHODS

- 22 subjects participated in this investigation (9 males, 13 females, 23.93±5.95 years old, 1.73±.11m, 77.7±20.9kg, Mean ± SD)
- Subjects were initially weighed in and their height was recorded by stadiometer.
- Subjects were then scanned by a total body DEXA scan utilizing simple clothing and subject removed all of their metal jewelry (GE Lunar Prodigy).
- After the scan 5 implants (silicone gel breast implants with high strength cohesive gel) were placed on top of their body:
- Left (470ml) and Right (470ml) Pectoralis
- Left (455ml) and Right (505ml) Hip
- Right (210ml) Thigh.
- Subjects were then scanned again immediately utilizing the same testing methodology.
- Lean mass, fat mass, and bone mass data was extracted both globally and regionally.
- Data Analysis: Data was then analyzed for significant difference between the scans utilizing a students paired t test with an alpha of $p < .05$ (* = $p < .05$).

RESULTS

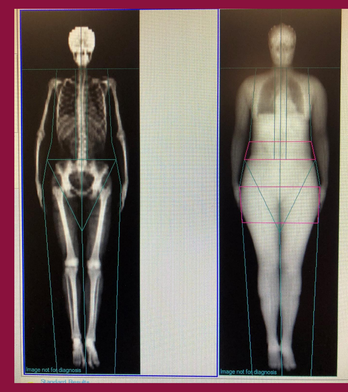
- Change in lean body mass from pre to post was:
  - overall .99±.66kg* (* = p<.05)
  - Torso 1.28±1.62kg*
  - Legs -.15±1.50kg.

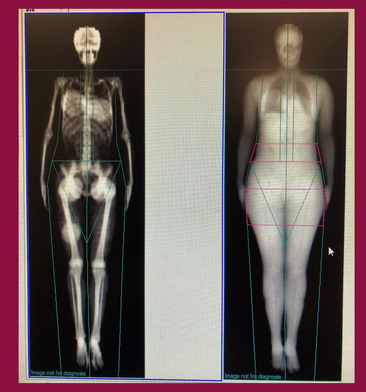
Table of All Values Quantified	Change in Values (Post-Pre)
Body Fat %	-0.071±0.470
Fat Free Mass (kg)	0.99±0.66
Fat Mass (kg)	0.47±0.55
Bone mass (kg)	0.49±0.22
Bone Mineral Content (g)	488.2±219.2
Bone Mineral Density Total (g/cm^3)	0.107±0.066
Bone Mineral Density Left Leg (g/cm^3)	0.040±0.059
Bone Mineral Density Right Leg (g/cm^3)	0.055±0.049
Bone Mineral Density Ribs (g/cm^3)	0.375±0.209
Bone Mineral Density Pelvis (g/cm^3)	0.201±0.185
Bone Mineral Density Spine (g/cm^3)	0.115±0.084
Bone Mineral Density Right Torso (g/cm^3)	0.254±0.158
Bone Mineral Density Left Torso (g/cm^3)	0.246±0.149
Right Leg Lean Mass (kg)	-0.17±0.90
Left Leg Lean Mass (kg)	0.03±0.60
Right Torso Lean Mass (kg)	0.62±0.80
Left Torso Lean Mass (kg)	0.67±0.83
Right Leg Fat Mass (kg)	-0.04±0.68
Left Leg Fat Mass (kg)	-0.01±0.38
Right Torso Fat Mass (kg)	0.18±0.50
Left Torso Fat Mass (kg)	0.41±0.66
Mean ± Standard Dev.	

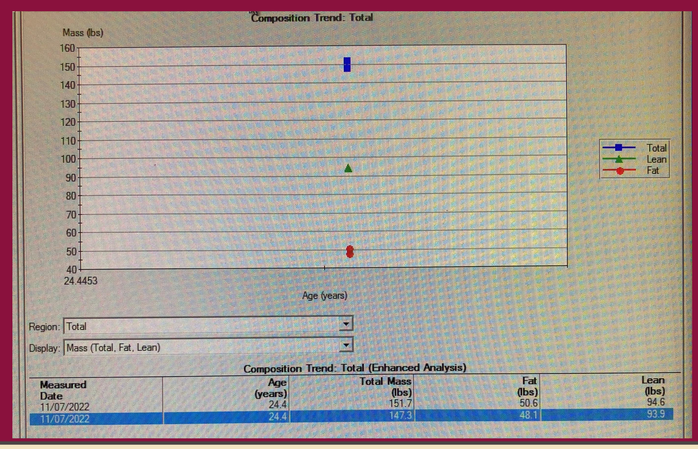


RESULTS

- Change in fat mass was:
  - Overall .47±.55kg*
  - Torso .59±1.15kg*
  - Legs -.05±1.06kg.
- Bone mineral density change:
  - Overall was .11±.07g/cm^3*
  - Torso was .50±.31g/cm^3
  - Legs was .09±.1g/cm^3*.
- Bone mineral content change was 488.2±219.2g*
- Bone mass change was .49±.22kg*.







CONCLUSIONS

- The addition of the implants greatly impacted the DEXA values for lean mass, fat mass, and bone mass.
- Further research should explore the relationships between body size, race, and implant size to these changes.
- Additionally, the composition of the implant of being silicone or saline.

PRACTICAL APPLICATIONS

- Individuals with implants will typically have a higher lean mass and much higher bone mass values from a DEXA scan and practitioners should be wary of a false negative for these populations being diagnosed with osteopenia or osteoporosis.

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Collegiate Female Soccer Athlete Acute To Chronic Training Stress Relationships To Injury Over a Competitive Season

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BACKGROUND & SIGNIFICANCE

- Understanding what increases athlete risk for injury is important with the current era of athlete tracking systems.
- The acute to chronic workload ratio has been shown to be related to injury risks in a variety of populations.
- How this relationship changes depending on sport needs to be further investigated, specifically in female sports.

PURPOSE

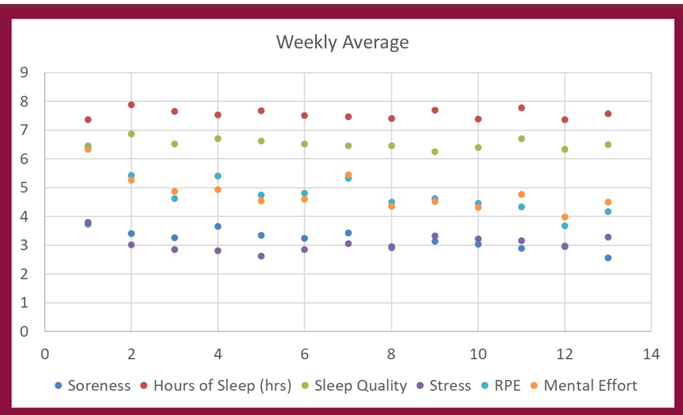
- To analyze weekly training volumes and intensity that soccer athletes encounter throughout a competitive season and examine their relationships to injury rates.

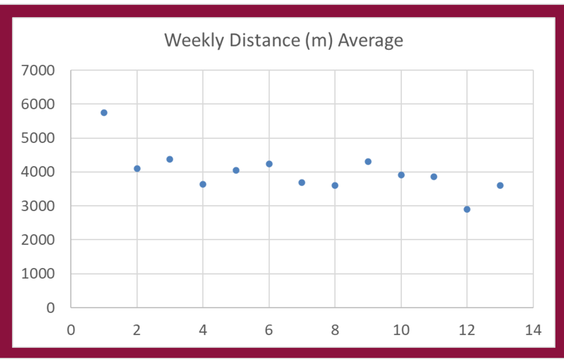
METHODS

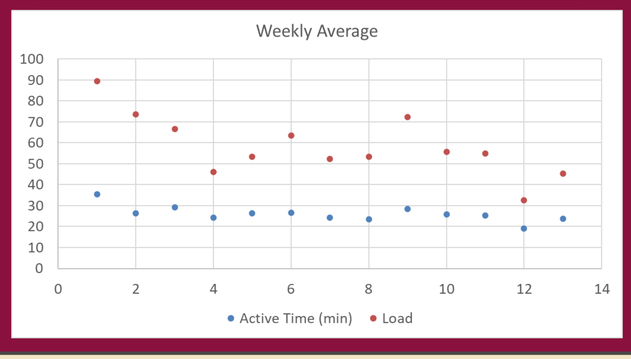
- 34 Division I collegiate women's soccer players participated in this tracking (age, height, 62.4±8.2 kg, Mean±SD, Position Groups: 7 forwards, 9 midfielders, 14 defenders, 4 goalies).
- Athletes wore accelerometer sensors for each of the training and game sessions. Sensors recorded acceleration at 10 Hz and derived velocity and distance covered.
- Player distance covered, active time, and load were used for analysis. Athletes typically practiced 4-5 days per week and played 1-2 games throughout the season. Data was tracked from the start of the preseason until the end of the competitive season.
- Athletes filled out daily questionnaires asking them for their soreness, rating of perceived exertion (RPE), stress, mental effort, sleep quantity (hours), sleep quality (ligert scale 1-10), source of highest stress (athletics, academics, stress free, other), steps per day, resting heart rate upon waking in the morning, and meals eaten on a given day.
- Data was analyzed for acute (1 week) to chronic (4 weeks) ratios and rates of incidences of injury. Injury was defined as any even that caused an athlete to be removed from one or more practices. The acute to chronic ratio of the preceding week and month respectively was used for analysis. Correlations between values was assessed with significance set at an alpha of p<.05.

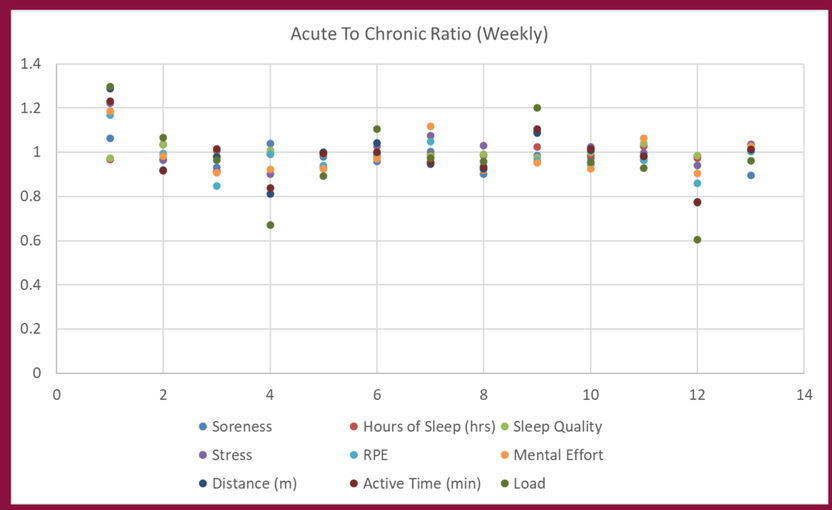
Daily Average Starters	RPE	Mental Effort	Distance (m)	Active Time (min)	Load
Goalies	4.429979	4.932034			
Defenders	6.466703	6.778664	4608.47	31.09364	81.76828
Midfielders	5.506957	5.327983	5099.818	33.14031	75.48913
Forwards	5.29602	4.275868	4538.255	30.48604	69.68825

Daily Average Non Starters	RPE	Mental Effort	Distance (m)	Active Time (min)	Load
Goalies	5.019231	4.51641			
Defenders	4.188153	3.916431	3091.773	18.56586	32.5828
Midfielders	4.137845	4.128114	4421.376	27.27122	67.4929
Forwards	5.276472	5.95391	3211.146	20.03994	40.77698









Date	Soreness	Hours of Sleep (hrs)	Sleep Quality	RPE	Mental Effort	Distance (m)	Active Time (min)	Load
Soreness	1	0.003935	-0.09281	0.102087	0.068094	-0.06631114	-0.04751	-0.07889
Hours of Sleep (hrs)		1	0.434978	0.082796	0.112573	0.26791553	0.270448	0.194883
RPE				1	0.736759	0.587666618	0.618742	0.420395
Mental Effort					1	0.408783091	0.429571	0.289609
Distance (m)						1	0.972749	0.792211
Active Time (min)							1	0.699417
Load								1

RESULTS

- In total there was 26 documented injuries, 5 contact, 21 non-contact. 20 were soft tissue injuries and 6 were hard tissue.
- There were no significant relationships between injury date and the acute to chronic ratio during the players week of the injury. Values were as follows:
- Distance covered (1.014±.017AU)
- Active time (1.015±.016AU), player load (1.013±.024 AU),
- RPE (.991±.015 AU),
- Mental effort (.997±.013 AU),
- Stress 1.003±.009 AU),
- Soreness (.993±.014 AU),
- Sleep quantity (1.001±.005 AU),
- Sleep quality (1.000±.004 AU).

CONCLUSIONS

- Overall, there were no relationships between the acute to chronic training load relationship when observed for this population sample.
- This is likely due to the total volume of training never being that great compared to previous work that has shown injury rates rapidly increase when the acute to chronic workload ratio is over 1.5 and highest values observed in this investigation was lower for any metric in this investigation.
- There were however significant relationships between RPE, Distance Covered, Active Time, Player Load, and Mental Effort.

PRACTICAL APPLICATIONS

- Having athletes rate their session RPE can be a method to indicate the total stress that they have undergone in the given session and per week.
- Mental effort is another good proxy, and soreness has some utility, but is much weaker of a relationship.

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