

Original articles

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Physiological Circadian Variability of Leg Volume in Different Postural Conditions

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Aim. 1. To establish variation in leg volume in healthy subjects (HS) exposed to prolonged hydrostatic pressure. **2.** To establish variation in leg volume in HS in the absence of gravitational gradient.

Methods. The study was carried out on two HS groups: the group A (20 subjects, 12 females and 8 males, 32.8±7.8 y.o.) were doctors and nurses who voluntarily submitted to water plethysmography test pre and post eight hour standing in surgery. The group B (20 subjects, 10 females and 10 males, 24.1±3.9 y.o.) were volunteers assessed after 10 hours in supine position.

Results. Group A: leg volume at baseline was 1857.5 ml±196.9 on the right, and 1850 ml±194.7 on the left. After eight hours of exposure to hydrostatic pressure the volume of the two lower limbs was significantly increased to 1945 ml±209.6, and to 1940 ml±216.2, respectively (p<0.0001). The increased volume is significantly correlated with time (R2=0.95, p<0.0001). Group B: leg volume at baseline was 1875 ml±175.1 on the right, and 1862.5 ml±166.9 on the left. After ten hours the volume was 1770 ml±195.6 and to 1757.5 ml±194.2, respectively (p<0.0001). The decreased volume is significantly but inverted correlated with time (R2= -0.99, p<0.0001).

Conclusions. Both strong relationships clearly indicate hydrostatic pressure as the main actor in fluid accumulation over time in the lower extremity. This represents a major risk factor in workers exposed to gravitational gradient.

Effect of the Elastic Stoking on the Circadian Variability of Leg Volume in Healthy Workers Exposed to Prolonged Gravitational Gradient

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Aim. To assess the effect of elastic stocking in Healthy subject (HS) exposed for working reason to hydrostatic pressure.

Methods. The cohort was composed by 20 HS (10 females and 10 males, 28.6±3.2 y.o.), doctors who voluntarily were measured by the means of water plethysmography test pre and post eight hour standing in surgery, respectively with and without stocking exerting 20-30mmHg of pressure at the ankle.

Results. In workers exposed to prolonged hydrostatic pressure the leg volume is significantly different after 8 hours of exposure to gravitational gradient (p<0.0001); in addition, the increased volume is strongly related to time of exposure (R2 = 0.95). To the contrary, the baseline volume was paradoxically increased respect to the end of the experiment, albeit not significantly, with elastic stocking. Finally, the decreased volume is significantly but inverted correlated with time (R2 = -0.99, p<0.0001).

Conclusions. Our experiment demonstrates that elastic stocking may effectively counteract the increased leg volume over time in workers exposed to prolonged gravitational gradient. In perspective, this may correct one of the major risk factor for the development of chronic venous insufficiency.



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EFFETTO DELLE CALZE ELASTICHE SULLA VARIABILITÀ CIRCADIANA DEL VOLUME DELLE GAMBE IN LAVORATORI SANI ESPOSTI PROLUNGATAMENTE AL GRADIENTE GRAVITAZIONALE.

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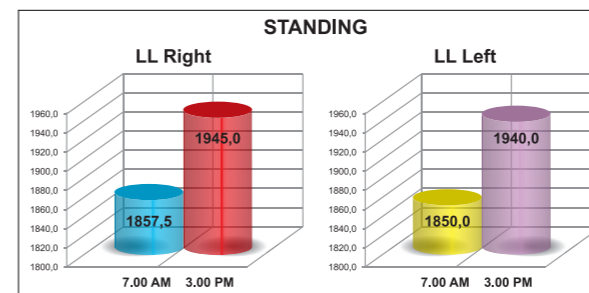
Chief: Prof. Paolo Zamboni



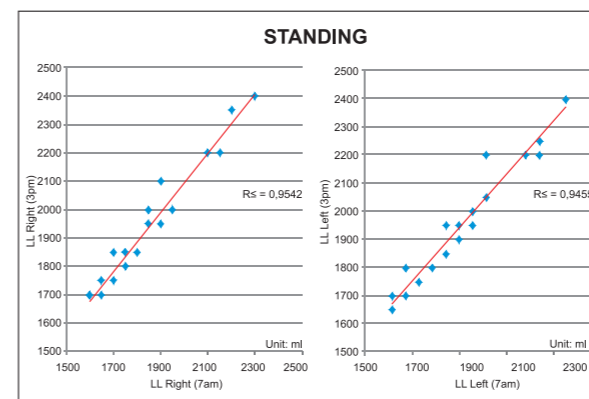
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DISCLOSURE: NO CONFLICT OF INTEREST

BACKGROUND



Il volume delle gambe aumenta significativamente restando in piedi o seduti per lunghi periodi, come è stato dimostrato nei lavoratori sani esposti per otto ore consecutive alla forza di gravità.
P<0.0001



L'edema (gonfiore) aumenta nel corso dell'orario di lavoro. È stata dimostrata una significativa correlazione tra l'aumento del volume delle gambe ed il tempo di esposizione restando in piedi o seduti per lunghi periodi in lavoratori sani.
R2=0.95 e P<0.0001

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SCOPO DELLO STUDIO

Date queste premesse, la nostra ipotesi è di verificare se le calze elastiche possono contrastare l'edema nei lavoratori sani esposti all'ortostatismo prolungato.

Abbiamo testato calze elastiche esercitanti 20-30 mmHg (millimetri di Mercurio) alla caviglia*.

*PreVein Flebysan, Italy



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POPOLAZIONE

20 chirurghi, 10 uomini e 10 donne, età media 28.6 ± 3.2 esposti per otto ore alla forza di gravità restando in piedi o seduti in sala operatoria.

Clinica ed esame Eco Color Doppler (ECD) testimoniavano che si trattava di controlli sani.

METODO



La valutazione pleτισmografica ad acqua del volume delle gambe è stata effettuata prima e dopo il turno di lavoro.

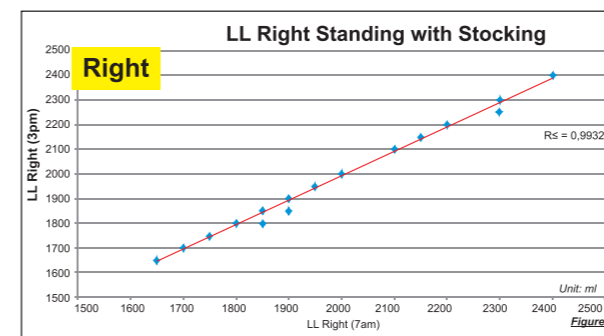


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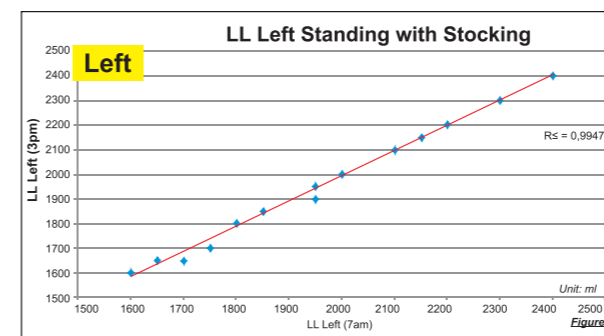


RISULTATI



Ancor più interessante, la riduzione del volume delle gambe era correlata significativamente con il tempo trascorso al lavoro con le calze elastiche.

$$R^2 = -0.99, P < 0.0001$$

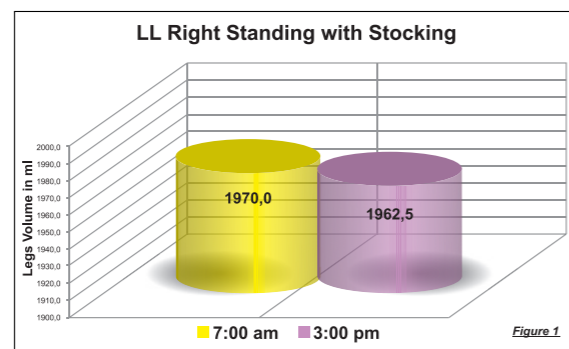


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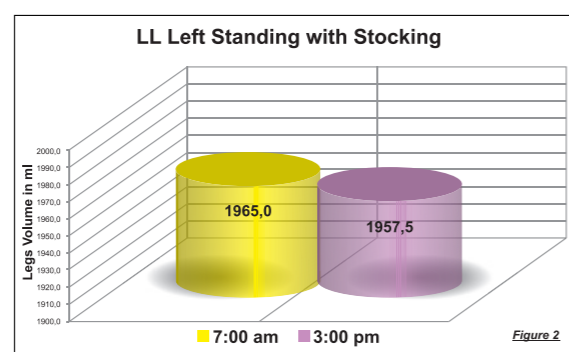
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RISULTATI



Differentemente dal primo studio senza calza elastica, in questo studio, restando in piedi o seduti per lunghi periodi nei lavoratori sani che indossano le calze elastiche, la forza di gravità non produce aumento di volume (gonfiore) negli arti inferiori.



Il gonfiore tendeva addirittura a calare sebbene in modo non significativo. Tuttavia la P era di $0,08$ che ci suggerisce un propizio trend statistico.



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CONCLUSIONI

- *Familiarità, sesso, gravidanza, lavoro in piedi o seduti sono tutti fattori di rischio molto noti per l'insufficienza venosa cronica (IVC).*
- *Tuttavia, tra i fattori di rischio appena citati, solo il lavoro in piedi o seduti sono fattori di rischio modificabili.*
- *Il nostro studio dimostra che le calze elastiche (PreVein Flebysan, Italy) possono prevenire che l'esposizione alla forza di gravità, per motivi lavorativi, possa diventare un fattore di rischio per l'insufficienza venosa cronica (IVC) in lavoratori sani.*



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