I. ULUSLARARASI SPORDA VE EGZERSİZDE BESLENME KONGRESİ
3 - 5 KASIM 2023
Sağlık Bilimleri Üniversitesi
Gülhane Konferans Salonu
ANKARA

Spor ve Egzersizde Sıvı Gereksinimi: Performansı etkiler mi?

Dr. Öğr. Üyesi. Nesli ERSOY

Hacettepe Üniversitesi

Sağlık Bilimleri Fakültesi

Beslenme ve Diyetetik Bölümü

Vücut sıvı dengesinin sağlanması

Sağlık için önemli

Spor performansı !!!

What Does Water do for You?

Tükürük salgısında

Forms saliva

Mukozal membranın nemli kalması

membranes moist

Hücre çoğalması ve büyümesi

to grow, reproduce

Atık ürünlerin uzaklaştırılması

Eklemlerin kayganlaştırılması

Birçok vücut kompartmanının bileşeni

Beyinde hormon ve nörotransmitter sentezi

Terleme ve solunumla vücut sıcaklığının düzenlenmesi

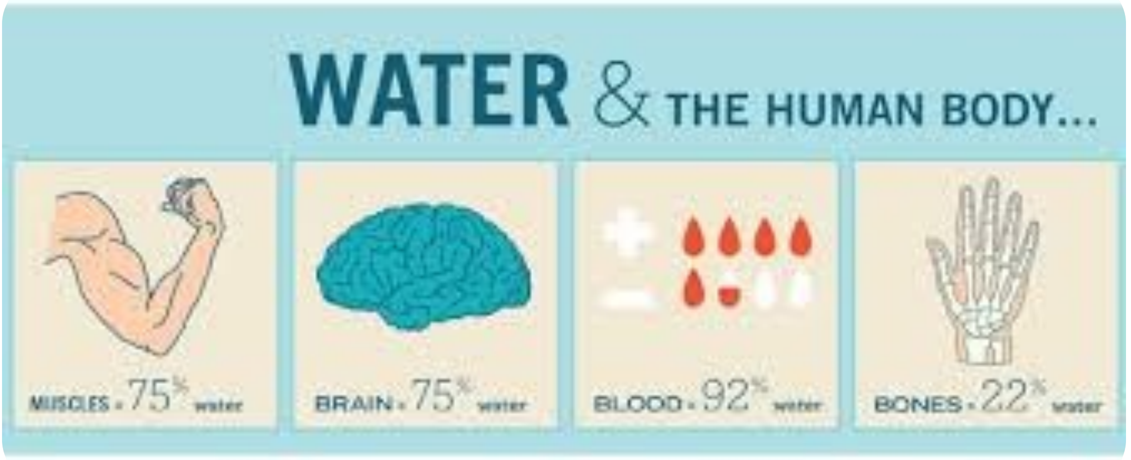
Beyin ve spinal kordun darbelere karşı korunması

Sindirim gibi hayati fonksiyonlar

Oksijenin taşınması

Vücut su miktarı

- ✓Yaş
- ✓Cinsiyet
- ✓Vücut bileşimi
- ✓**Fiziksel aktivite**



VÜCUT SIVI DENGESİ

VÜCUT SIVI DENGESİ

+	−
Yiyecek	İdrar
İçecek	Deri/Ter
Metabolizma sonucu oluşan su	Gaita
	Akciğerler/Solunum

Vücut sıvı dengesinin sağlanması

Kan/plazma osmolalitesi

Ekstraselüler sıvı hacmi

Reseptör (hipotalamus)

Hormon (pituiter bez)

Sıvı tüketim

Sıvı atımı

Hidrasyon

Dehidrasyon~ Hipohidrasyon

Hiperhidrasyon

Öhidrasyon

Rehidrasyon

Hiponatremi

Dehidrasyon

<u>*İzotonik*</u>

Su kaybı = Elektrolit kaybı

<u>*Hipertonik*</u>

Su kaybı > Elektrolit kaybı

<u>*Hipotonik*</u>

Su kaybı < Elektrolit kaybı

Dehidrasyon

- ↓ Kan hacmi
- ↓ Kalp atım hızı
- ↑ Vücut sıcaklığı
- Enzim fonksiyonları etkilenir

Hiponatremi

Su kaybının fazla olduğu durumlarda

Yoğun terlemenin olduğu Na kaybının fazla olduğu durumlarda

Baş ağrısı

Kafa karışıklığı

Kendini kötü hissetme

Mide bulantısı

Kramp

Ultra dayanıklılık sporcuları riskli grupta!!!

«6-8 saat'lik antrenmanlarda»

Hiponatremi

Plazma sodyumun 135 mmol/L'nin altında olması

Terleme hızı fazla olan sporcular risk altında (>1.2 L/saat)

Ter sodyum oranı fazla olanlar

Terle kaybedilen elektrolit kaybının saptanması önem kazanmakta

Dehidrasyon nedenleri

- Sıcaklık *(pasif dehidrasyon)*
- Sıcaklık + egzersiz *(aktif dehidrasyon)*
- Sıvı kısıtlaması *(pasif dehidrasyon)*

***Antrene** olamayan bireyler daha riskli*

- Aerobik antrene
- Anaerobik antrene

+

Cinsiyet (Menstrual siklus)
Sporcunun vücut sıcaklığı
Enerji sınırlaması

Dayanıklılık sporlarında durum

- Kasa giden kan akışının azalması
- Doku oksijenlenmesinin düşmesi
- Mitokondrial enerji üretiminin azalması (oksidatif fosforilasyon)

- Karbonhidrat kullanımı etkilenir
- Erken laktat üretimine neden olur ➡ Yorgunluk

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MEDICINE AND SCIENCE IN SPORTS AND EXERCISE

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Influence of diuretic-induced dehydration on competitive running performance

LAWRENCE E. ARMSTRONG, DAVID L. COSTILL, and
WILLIAM J. FINK

Vücut ağırlığının %2 kaybı sağlanarak dehidrate edilmiş

1500 m, 5000 m, 10000 m koşu performansları ölçülmüş

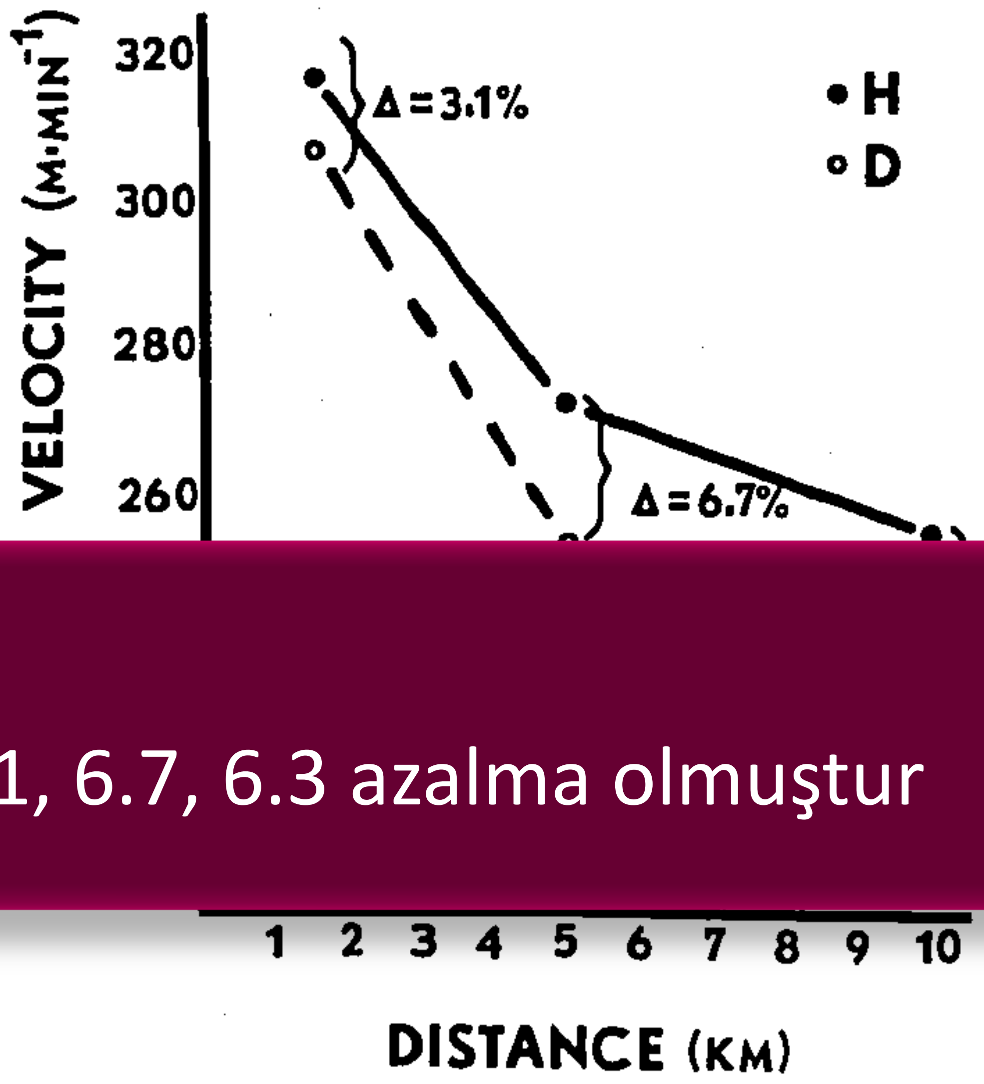
TABLE 3. Running performance times recorded on the outdoor 400-m track.

Subjects	Trial Time (min)					
	1500 m		5000 m		10,000 m	
	H	D	H	D	H	D
A	4.50	4.45	16.23	16.77	33.48	34.60
B	4.92	5.43	19.05	20.30	41.87	42.40
Mean	4.71	4.87	18.22*	19.53	38.87*	41.49
±SE	±0.16	±0.51	±0.85	±0.93	±1.73	±1.73

† ΔPV did not meet dehydration criterion (−2%).
* Significantly different from D trial ($P < 0.05$).

Koşu zamanı

0.13, 1.31, 2.6 dk gecikmiş



Hız

%3.1, 6.7, 6.3 azalma olmuştur

Figure 2—Group mean running velocities of hydrated (H) and dehydrated (D) outdoor track trials.

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Félix-Antoine Savoie[1,2] · Robert W. Kenefick[3] · Brett R. Ely[3,4] · Samuel N. Cheuvront[3] · Eric D. B. Goulet[1,2]

Kas performansı

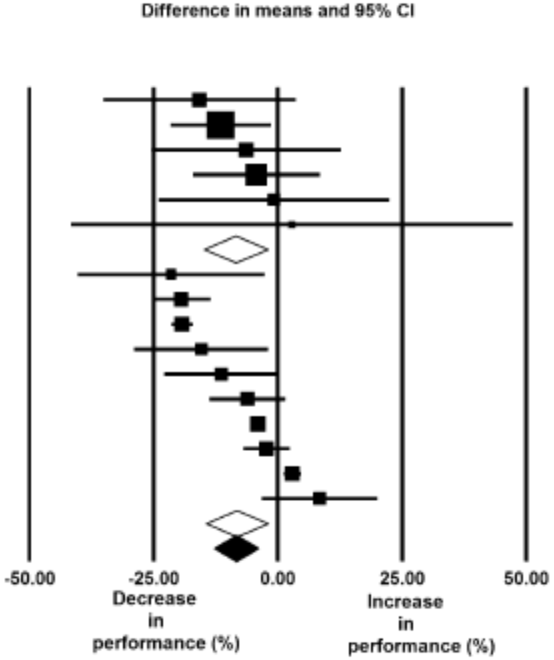
Dayanıklılık

Güç

Anaerobik güç

Anaerobik kapasite??? (p>0.05)

Study name and reference [ ]	Comparisons	Difference in means	Standard error	Lower limit	Upper limit	p-Value
Bijlani and Sharma (1980a) [30]	0	-15.8	9.9	-35.1	3.5	0.11
Kraft et al. (2010a) [38]	0	-11.5	5.1	-21.4	-1.6	0.02
Montain and Tharion (2010) [19]	0	-6.5	9.7	-25.4	12.5	0.51
Greiwe et al. (1998a) [35]	0	-4.4	6.5	-17.0	8.3	0.50
Gutiérrez et al. (2003a) [36]	0	-0.8	11.8	-23.9	22.3	0.95
Gutiérrez et al. (2003b) [36]	0	2.8	22.6	-41.6	47.2	0.90
Overall effect upper body		-8.4	3.3	-14.9	-2.0	0.01
Kraft et al. (2010b) [38]	1	-21.5	9.5	-40.2	-2.8	0.02
Caterisano et al. (1988a) [33]	1	-19.5	3.0	-25.3	-13.7	0.00
Caterisano et al. (1988c) [33]	1	-19.3	1.1	-21.4	-17.2	0.00
Montain et al. (1998a) [39]	1	-15.4	6.8	-28.8	-2.1	0.02
Bigard et al. (2001a) [8]	1	-11.4	5.8	-22.8	-0.1	0.05
Judelson et al. (2007b) [11]	1	-6.2	3.9	-13.7	1.4	0.11
Ftaiti et al. (2001a) [34]	1	-4.1	0.6	-5.2	-2.9	0.00
Judelson et al. (2007a) [11]	1	-2.3	2.3	-6.9	2.3	0.32
Caterisano et al. (1988b) [33]	1	2.9	0.9	1.2	4.6	0.00
Greiwe et al. (1998b) [35]	1	8.4	5.9	-3.2	19.9	0.16
Overall effect lower body		-8.2	3.2	-14.5	-2.0	0.01
Overall effect both groups combined		-8.3	2.3	-12.8	-3.9	0.00



Kas dayanıklılığı

Vücut ağırlığının %3’lük kaybı

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A Meta-Analysis

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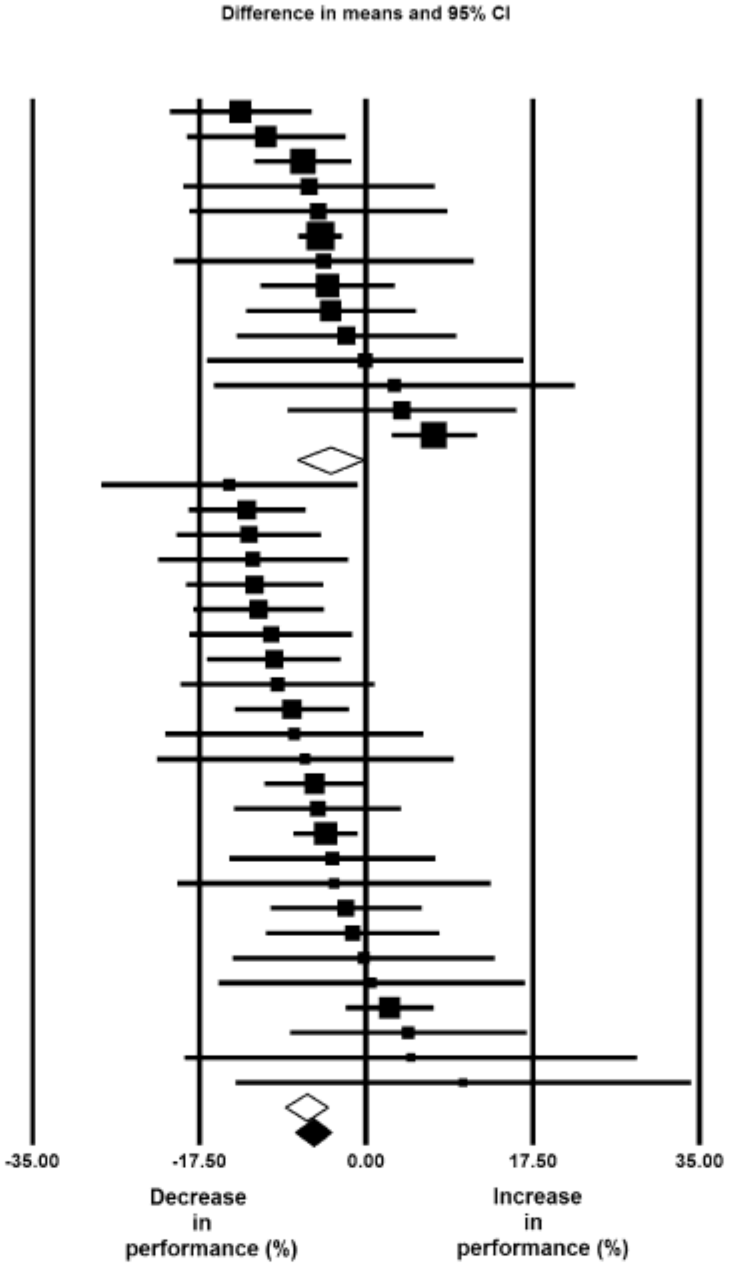
Eric D. B. Goulet[1,2]

Study name and reference [ ]	Comparisons	Difference in means	Standard error	Lower limit	Upper limit	p-Value
Bijlani and Sharma (1980a) [30]	0	-15.8	9.9	-35.1	3.5	0.11
Kraft et al. (2010a) [38]	0	-11.5	5.1	-21.4	-1.6	0.02
Montain and Tharion (2010) [19]	0	-6.5	9.7	-25.4	12.5	0.51
Greiwe et al. (1998a) [35]	0	-4.4	6.5	-17.0	8.3	0.50
Gutiérrez et al. (2003a) [36]	0	-0.8	11.8	-23.9	22.3	0.95
Gutiérrez et al. (2003b) [36]	0	2.8	22.6	-41.6	47.2	0.90
Overall effect upper body		-8.4	3.3	-14.9	-2.0	0.01
Kraft et al. (2010b) [38]	1	-21.5	9.5	-40.2	-2.8	0.02
Caterisano et al. (1988a) [33]	1	-19.5	3.0	-25.3	-13.7	0.00
Caterisano et al. (1988c) [33]	1	-19.3	1.1	-21.4	-17.2	0.00
Montain et al. (1998a) [39]	1	-15.4	6.8	-28.8	-2.1	0.02
Bigard et al. (2001a) [8]	1	-11.4	5.8	-22.8	-0.1	0.05
Judelson et al. (2007b) [11]	1	-6.2	3.9	-13.7	1.4	0.11
Ftaiti et al. (2001a) [34]	1	-4.1	0.6	-5.2	-2.9	0.00
Judelson et al. (2007a) [11]	1	-2.3	2.3	-6.9	2.3	0.32
Caterisano et al. (1988b) [33]	1	2.9	0.9	1.2	4.6	0.00
Greiwe et al. (1998b) [35]	1	8.4	5.9	-3.2	19.9	0.16
Overall effect lower body		-8.2	3.2	-14.5	-2.0	0.01
Overall effect both groups combined		-8.3	2.3	-12.8	-3.9	0.00

Kas dayanıklılığı

Study name and reference [ ]	Comparisons	Difference in means	Standard error	Lower limit	Upper limit	p-Value
Wilson et al. (2013a) [45]	0	-13.2	3.8	-20.6	-5.8	0.00
Bosco et al. (1968c) [32]	0	-10.5	4.2	-18.8	-2.2	0.01
Webster et al. (1990a) [12]	0	-6.6	2.6	-11.7	-1.6	0.01
Bijlani and Sharma (1980b) [30]	0	-6.0	6.7	-19.1	7.1	0.37
Bosco et al. (1974a) [31]	0	-5.0	6.9	-18.5	8.5	0.47
Schoffstall et al. (2001) [42]	0	-4.8	1.1	-7.0	-2.6	0.00
Bosco et al. (1968a) [32]	0	-4.4	8.0	-20.1	11.2	0.58
Gutiérrez et al. (2003c) [36]	0	-4.0	3.6	-11.0	2.9	0.26
Gutiérrez et al. (2003d) [36]	0	-3.7	4.5	-12.5	5.1	0.41
Bosco et al. (1968b) [32]	0	-2.0	5.8	-13.5	9.4	0.73
Périard et al. (2012b) [41]	0	-0.1	8.4	-16.7	16.4	0.99
Périard et al. (2012a) [41]	0	3.0	9.6	-15.9	21.9	0.76
Greiwe et al. (1998c) [35]	0	3.8	6.1	-8.2	15.7	0.54
Evetovich et al. (2002a) [7]	0	7.1	2.3	2.7	11.5	0.00
Overall effect upper body		-3.7	1.8	-7.2	-0.2	0.04
Bosco et al. (1974b) [31]	1	-14.3	6.8	-27.7	-0.9	0.04
Ftaiti et al. (2001b) [34]	1	-12.5	3.1	-18.6	-6.4	0.00
Hayes and Morse (2010d) [25]	1	-12.3	3.8	-19.8	-4.8	0.00
Hayes and Morse (2010c) [25]	1	-11.9	5.1	-21.8	-2.0	0.02
Hayes and Morse (2010e) [25]	1	-11.7	3.6	-18.9	-4.6	0.00
Minshull and James (2013) [20]	1	-11.3	3.5	-18.0	-4.5	0.00
Hayes and Morse (2010b) [25]	1	-10.0	4.3	-18.5	-1.5	0.02
Bowtell et al. (2013) [18]	1	-9.7	3.6	-16.6	-2.7	0.01
Périard et al. (2012c) [41]	1	-9.3	5.2	-19.4	0.8	0.07
Viitasalo et al. (1987a) [44]	1	-7.8	3.0	-13.7	-1.9	0.01
Viitasalo et al. (1987b) [44]	1	-7.6	6.9	-21.0	5.9	0.27
Bosco et al. (1968d) [32]	1	-6.4	7.9	-21.9	9.2	0.42
Del Coso et al. (2008) [24]	1	-5.4	2.7	-10.6	-0.2	0.04
Hayes and Morse (2010a) [25]	1	-5.1	4.4	-13.8	3.6	0.25
Wilson et al. (2013b) [45]	1	-4.2	1.7	-7.6	-0.9	0.01
Périard et al. (2012d) [41]	1	-3.6	5.5	-14.3	7.2	0.52
Bosco et al. (1968f) [32]	1	-3.4	8.4	-19.8	13.0	0.69
Judelson et al. (2007c) [11]	1	-2.1	4.0	-10.0	5.8	0.60
Bigard et al. (2001b) [8]	1	-1.4	4.6	-10.5	7.7	0.76
Stewart et al. (2014) [43]	1	-0.2	7.0	-13.9	13.5	0.98
Bosco et al. (1968e) [32]	1	0.6	8.2	-15.4	16.6	0.94
Judelson et al. (2007d) [11]	1	2.5	2.3	-2.1	7.0	0.28
Montain et al. (1998b) [39]	1	4.5	6.3	-7.9	16.8	0.48
Greiwe et al. (1998d) [35]	1	4.7	12.1	-19.0	28.4	0.70
Webster et al. (1990b) [12]	1	10.2	12.2	-13.7	34.0	0.40
Overall effect lower body		-6.2	1.1	-8.4	-4.0	0.00
Overall effect both groups combined		-5.5	1.0	-7.4	-3.6	0.00



Kas gücü

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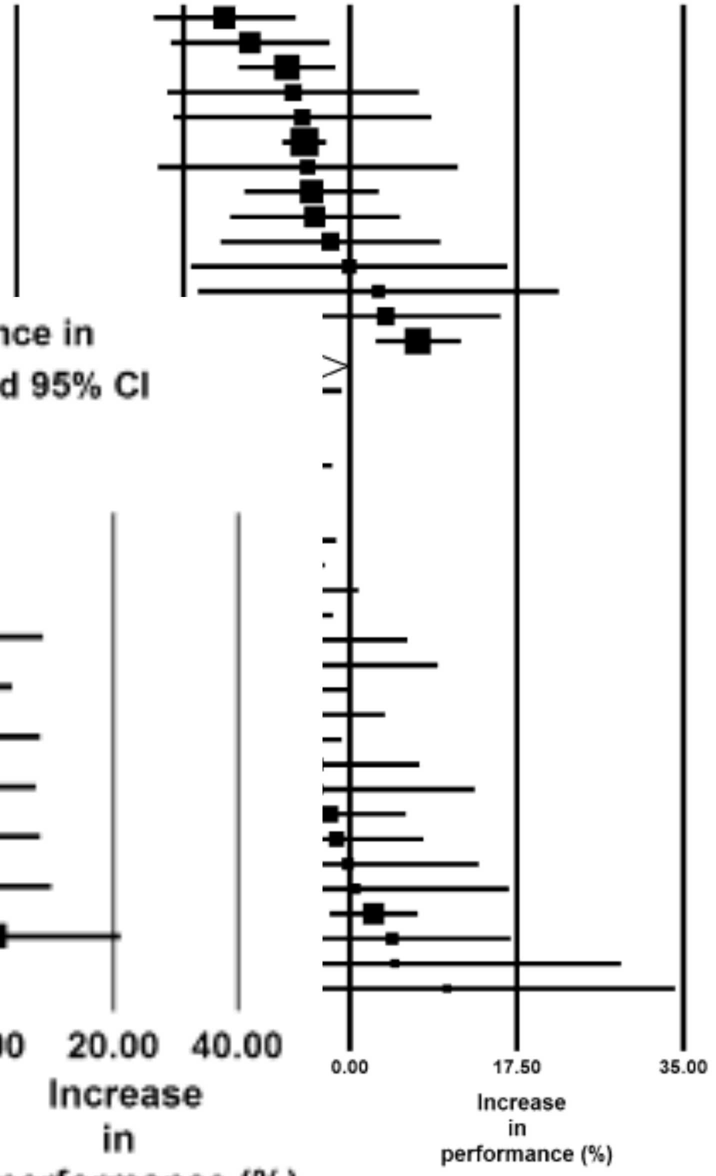
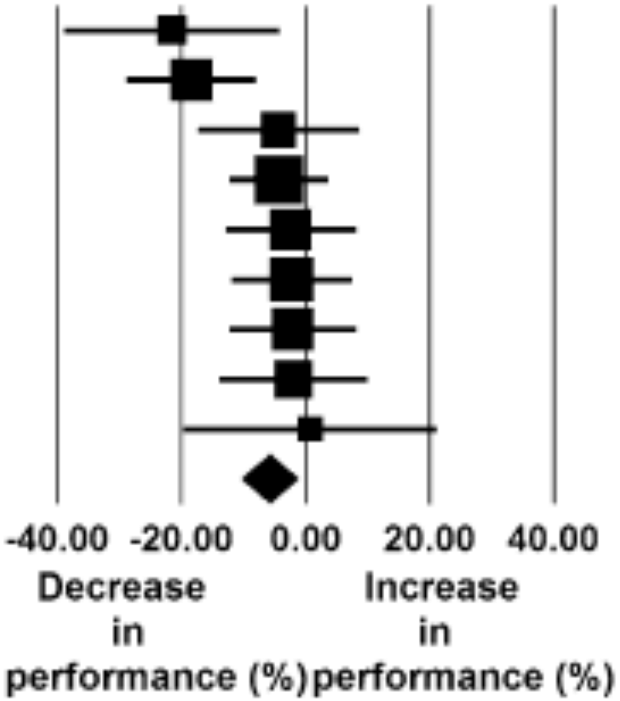
Bosco et al. (1968c) [32]	0	-10.5	4.2	-18.8	-2.2	0.01
Webster et al. (1990a) [12]	0	-6.6	2.6	-11.7	-1.6	0.01
Bijlani and Sharma (1980b) [30]	0	-6.0	6.7	-19.1	7.1	0.37
Bosco et al. (1974a) [31]	0	-5.0	6.9	-18.5	8.5	0.47
Schoffstall et al. (2001) [42]	0	-4.8	1.1	-7.0	-2.6	0.00
Bosco et al. (1968a) [32]	0	-4.4	8.0	-20.1	11.2	0.58
Gutiérrez et al. (2003c) [36]	0	-4.0	3.6	-11.0	2.9	0.26
Gutiérrez et al. (2003d) [36]	0	-3.7	4.5	-12.5	5.1	0.41
Bosco et al. (1968b) [32]	0	-2.0	5.8	-13.5	9.4	0.73
Périard et al. (2012b) [41]	0	-0.1	8.4	-16.7	16.4	0.99
Périard et al. (2012a) [41]	0	3.0	9.6	-15.9	21.9	0.76



Study name and reference [ ]	Difference in means	Standard error	Lower limit	Upper limit	p-Value
Webster et al. (1990c) [12]	-21.5	8.8	-38.7	-4.3	0.01
Jones et al. (2008a) [13]	-18.4	5.3	-28.7	-8.1	0.00
Naharudin and Yusof (2013b) [40]	-4.3	6.6	-17.2	8.5	0.51
Cheuvront et al. (2006a) [17]	-4.3	4.0	-12.1	3.6	0.29
Jacobs (1980c) [37]	-2.3	5.3	-12.8	8.1	0.66
Jacobs (1980a) [37]	-2.2	4.9	-11.7	7.3	0.65
Jacobs (1980b) [37]	-2.1	5.2	-12.2	8.0	0.68
Naharudin and Yusof (2013c) [40]	-1.9	6.0	-13.7	9.8	0.75
Naharudin and Yusof (2013a) [40]	0.8	10.3	-19.5	21.0	0.94
Overall effect	-5.8	2.3	-10.3	-1.3	0.01

Difference in means and 95% CI



Aerobik güç

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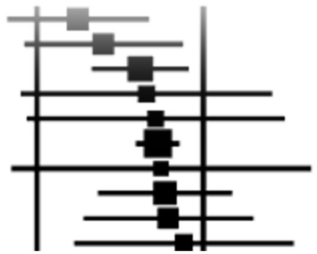
Eric D. B. Goulet[1,2]

Kas performansı

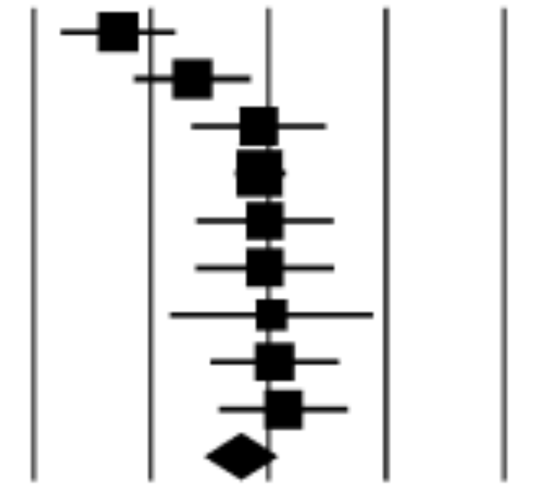
Dayanıklılık

Study name and reference		Difference in means	Standard error	Lower limit	Upper limit	p-Value
...et al. (2013a) [45]	0	-13.2	3.8	-20.6	-5.8	0.00
...sco et al. (1968c) [32]	0	-10.5	4.2	-18.8	-2.2	0.01
Webster et al. (1990a) [12]	0	-6.6	2.6	-11.7	-1.6	0.01
Bijlani and Sharma (1980b) [30]	0	-6.0	6.7	-19.1	7.1	0.37
...sco et al. (1974a) [31]	0	-5.0	6.9	-18.5	8.5	0.47
...hoffstall et al. (2001) [42]	0	-4.8	1.1	-7.0	-2.6	0.00
...sco et al. (1968a) [32]	0	-4.4	8.0	-20.1	11.2	0.58
Gutiérrez et al. (2003c) [36]	0	-4.0	3.6	-11.0	2.9	0.26
Gutiérrez et al. (2003d) [36]	0	-3.7	4.5	-12.5	5.1	0.41
...sco et al. (1968b) [32]	0	-2.0	5.8	-13.5	9.4	0.73



Study name and reference [ ]	Difference in means	Standard error	Lower limit	Upper limit	p-Value
Jones et al. (2008b) [13]	-19.2	3.7	-26.4	-12.0	0.00
Webster et al. (1990d) [12]	-9.7	3.8	-17.1	-2.3	0.01
Jacobs (1980e) [37]	-1.3	4.3	-9.7	7.2	0.77
Cheuvront et al. (2006b) [17]	-1.1	1.6	-4.2	2.0	0.49
Naharudin and Yusof (2013f) [40]	-0.5	4.4	-9.2	8.2	0.91
Jacobs (1980f) [37]	-0.5	4.5	-9.2	8.3	0.92
Naharudin and Yusof (2013d) [40]	0.4	6.6	-12.5	13.2	0.96
Jacobs (1980d) [37]	0.8	4.1	-7.3	8.9	0.85
Naharudin and Yusof (2103e) [40]	1.9	4.2	-6.3	10.1	0.65
Overall effect	-3.5	2.3	-8.0	1.0	0.13

Difference in means and 95% CI



Aerobik kapasite

Kuvvet veya sıklet sporlarında durum

- Sıcak çevre (sauna, sıcak ortam veya buhar odası)
- Diüretik, emetik ve laksatif kullanımı
- Kendi kendini kusturma

↓

- Kardiovasküler fonksiyon
- Elektrolit dengesi
- Renal fonksiyon
- Termal regülasyon
- Vücut kompozisyonu
- Kas dayanıklılığı ve gücü

Karbonhidrat kullanımı etkilenir

Erken laktat üretimine neden olur

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Research article

Acute effects of self-selected regimen of rapid body mass loss in combat sports athletes

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Antrene dövüş sporcuları

- 3 dakikalık tekrarlı egzersizlerde kas performansının düştüğü

3 gün içerisinde vücut ağırlığının %5.1'inin kayba uğratılıyor.

- Enerji ve sıvı alımı sınırlanıyor
- Orta derecede sauna uygulaması

Hyperthermia and Dehydration-Related Deaths Associated With Intentional Rapid Weight Loss in Three Collegiate Wrestlers— North Carolina, Wisconsin, and Michigan, November-December 1997

MMWR. 1998;47:105-108

During November 7-December 9, 1997, three previously healthy collegiate wrestlers in different states died while each was engaged in a program of rapid weight loss to qualify for competition. In the hours preceding the official weigh-in, all three wrestlers engaged in a similar rapid weight-loss regimen that promoted dehydration through perspiration and resulted in hyperthermia. The wrestlers restricted food and fluid intake and attempted to maximize sweat losses by wearing vapor-impermeable suits under cotton warm-up suits and exercising vigorously in hot environments. This report summarizes the investigation of these three cases.

atinine results were unavailable. Anatomic findings from the autopsy were insufficient to determine the cause of death.

Case 2. On November 21, over a 4-hour period, a 22-year-old man in Wisconsin attempted to lose 4 lbs to compete in the 153-lb weight class of a wrestling tournament scheduled for November 22. His preseason weight on September 6 was 178 lbs. During the next 10 weeks he lost 21 lbs, of which 8 lbs were lost during November 17-20. On November 21 at 5:30 a.m., he initiated the same weight-loss regimen as in case 1. An hour later, he complained of shortness of breath but continued exercising. By 8:50 a.m., he had lost 3.5 lbs. He drank approximately 8 oz of wa-

p.m., he lost 2.3 lbs and weighed 156.7 lbs. After wrestling practice, he initiated the same weight-loss regimen as in case 1; after 75 minutes, he had lost an additional 2 lbs. After a 15-minute rest, he resumed exercise. Approximately 1 hour later, he stopped exercising to weigh himself and demonstrated fatigue. A few minutes later, his legs became unsteady, he became incommunicative, and he had difficulty breathing. Attempts to administer fluid orally were unsuccessful, and he developed cardiorespiratory arrest. Resuscitation was unsuccessful. Chemistry findings in vitreous humor obtained 4 hours after death were sodium, 159 mmol/L (normal: 136-146 mmol/L); urea nitrogen, 31

3 güreşçi (19-22 yaş arası)

- Daha önceden tanısı konmuş hastalığı bulunmayan
- Sezon öncesi (10 hafta) hızla vücut ağırlık kaybı yaşamış (%10 üzeri)
- Besin ve sıvı alımının sınırlandığı
- Terle sıvı kaybının desteklendiği uygulamalar sonucunda

Hipertermi kaynaklı kardiorespiratuar arest vakaları

Kan Sodyum
Ürenitrojen
Üremiyoglobin
Kreatinin
↑

SONUÇ OLARAK; kısa süreli yüksek yoğunluktaki egzersiz performansı olumsuz etkilenir.

- Kısa süreli uygulama yapılacaksa vücut ağırlığının
  kayba uğrayacağı şekilde düzenlenmesi g

The Norwegian

%3-4 ile sınırlanabileceği belirtilmiş

- Sıvı tüketimin yanı sıra besin alımının da sınırlı olmasının kas glikojen ve asit-baz dengesi üzerine etkili olabileceği belirtilmektedir.

Kardiovasküler fitness da etkilenmektedir

<u>SONUÇ OLARAK;</u> dinleme metabolik hız etkilenmektedir

- DMH'ın azalması vücut kompozisyonunu olumsuz etkiler

<u>Biyokimyasal parametreler</u>

- Kan hemoglobin, hematokrit
- Serum kreatinin
- Testosteron
- Luteinleştirici hormon

Anksiyete

ÖNERİLER

«İlk öneri 1970'li yıllarda ACSM önerisi»

ACSM *(American College of Sports Medicine)*

SPECIAL COMMUNICATIONS

AMERICAN COLLEGE of SPORTS MEDICINE®

POSITION STAND

Exercise and Fluid Replacement

This pronouncement was written for the American College of Sports Medicine by Michael N. Sawka, FACSM (chair); Louise M. Burke, FACSM, E. Randy Eichner, FACSM, Ronald J. Maughan, FACSM, Scott J. Montain, FACSM, Nina S. Stachenfeld, FACSM.

SUMMARY

This Position Stand provides guidance on fluid replacement to sustain appropriate hydration of individuals performing physical activity. The goal of prehydrating is to start the activity euhydrated and with normal plasma electrolyte levels. Prehydrating with beverages, in addition to normal meals and fluid intake, should be initiated when needed at least several hours before the activity to enable fluid absorption and allow urine output to return to normal levels. The goal of drinking during exercise is to prevent excessive (>2% body weight loss from water deficit) dehydration and excessive changes in electrolyte balance to avert compromised performance. Because there is considerable variability in sweating rates and sweat electrolyte content between individuals, customized fluid replacement programs are recommended. Individual sweat rates can be estimated by measuring body weight before and after exercise. During

and the impact of their imbalances on exercise performance and health. This position statement replaces the prior Position Stand on exercise and fluid replacement published in 1996 (39). The new Position Stand includes a Strength of Recommendation Taxonomy (SORT) to document the strength of evidence for each conclusion and recommendation (50). Table 1 provides a description of strength of evidence category employed, based on thequality, quantity and consistency of the evidence for each statement. Occasionally review papers have been cited, to reduce the number of references, which provide extensive documentation regarding supporting studies. Recommendations are

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KESİN BİLGİ!!!

Sıvı gereksinmesi

Aktif olan bireyler > Aktif olmayan bireyler

TABLE 6. American College of Sports Medicine exercise and fluid replacement Position Stand evidence statements.

Section Heading	Evidence Statement	Evidence Category
Fluid & Electrolyte Requirements	Exercise can elicit high sweat rates and substantial water and electrolyte losses during sustained exercise, particularly in warm-hot weather.	A
	There is considerable variability for water and electrolyte losses between individuals and between different activities.	A
	If sweat water and electrolyte losses are not replaced then the person will dehydrate.	A
Hydration Assessment	Individuals can monitor their hydration status by employing simple urine and body weight measurements.	B
	A person with a first morning USG $\leq$ 1.020 or UOsmol $\leq$ 700 mOsmol·kg^{-1} can be considered as euhydrated.	B
	Several days of first morning body weight values can be used to establish base-line body weights that represent euhydration.	B
	Body weight changes can reflect sweat losses during exercise and can be used to calculate individual fluid replacement needs for specific exercise and environmental conditions.	A
Hydration Effects	Dehydration increases physiologic strain and perceived effort to perform the same exercise task, and is accentuated in warm-hot weather.	A
	Dehydration (>2% BW) can degrade aerobic exercise performance, especially in warm-hot weather.	A
	The greater the dehydration level the greater the physiologic strain and aerobic exercise performance decrement.	B
	Dehydration (>2% BW) might degrade mental / cognitive performance.	B
	Dehydration (3% BW) has marginal influence on degrading aerobic exercise performance when cold stress is present.	B
	Dehydration (3–5% BW) does not degrade either anaerobic performance or muscular strength.	A & B
	The critical water deficit and magnitude of exercise performance degradation are related to the heat stress, exercise task, and the individual's unique biological characteristics.	C
	Hyperhydration can be achieved by several but has equivocal benefits and several disadvantages.	B
	Dehydration is a risk factor for both heat exhaustion and exertional heat stroke.	A & B
	Dehydration can increase the likelihood or severity of acute renal failure consequent to exertional rhabdomyolysis.	B
	Dehydration and sodium deficits are associated with skeletal muscle cramps.	C
	Symptomatic exercise-associated hyponatremia can occur in endurance events.	A
	Fluid consumption that exceeds sweating rate is the primary factor leading to exercise-associated hyponatremia.	A
	Large sweat sodium losses and small body weight (and total body water) can contribute to the exercise-associated hyponatremia.	B
Modifying Factors	Women generally have lower sweating rates than men.	A
	Sex differences in renal water and electrolyte retention are subtle and probably not of consequence.	C
	Women are at greater risk than men to develop exercise-associated symptomatic hyponatremia.	C
	Older adults have age related decreased thirst sensitivity when dehydrated making them slower to voluntarily reestablish euhydration.	A
	Older adults have age related slower renal responses to water and may be at greater risk for hyponatremia.	A & C
	Children have lower sweating rates than adults.	B
	Meal consumption promotes euhydration.	A
	Sweat electrolyte (sodium and potassium) losses should be fully replaced to reestablish euhydration.	A
	Caffeine consumption will not markedly alter daily urine output or hydration status.	B
	Alcohol consumption can increase urine output and delay full rehydration.	B

YETERLİ SIVI TÜKETİMİNİN ÖNÜNDEKİ ENGELLER

- Alışkanlık
- Susama duyusundaki değişimler
- Egzersiz/müsabaka sırasında sıvıya ulaşamama
- Lezzet
- Tüketilen sıvının sıcaklığı (sıcak havalarda 0.5 °C en ideal sıcaklık)

Journal of Athletic Training 2000;35(2):212–224

www.journalofathletictraining.org

National Athletic Trainers' Association Position Statement: Fluid Replacement for Athletes

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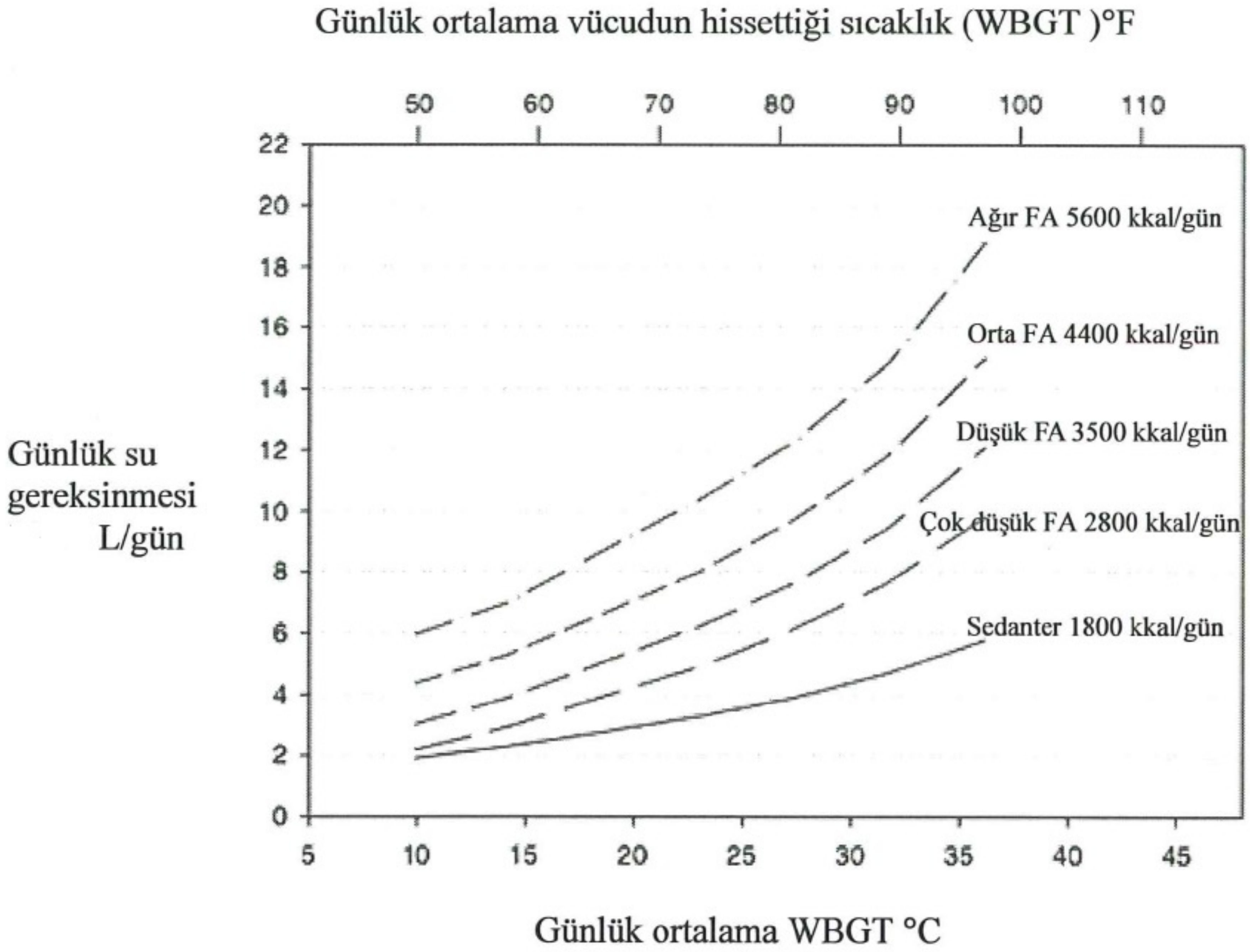
Günlük ortalama vücudun hissettiği sıcaklık (WBGT)°F
50
60
70
80
90
100
110
22
20
18
16
14
12
10
8
6
4
2
0
Günlük su gereksinmesi L/gün
Ağır FA 5600 kkal/gün
Orta FA 4400 kkal/gün
Düşük FA 3500 kkal/gün
Çok düşük FA 2800 kkal/gün
Sedanter 1800 kkal/gün
5
10
15
20
25
30
35
40
45
Günlük ortalama WBGT °C

Hidrasyon durumunun değerlendirilmesi

- Empedans ve seyreltme tekniği
- Hematolojik göstergeler
- İdrar göstergeleri
- Vücut ağırlık değişimi
- Tükürük analizi

SIVI PROTOKOLÜ