International Chair for Advanced Studies on Hydration

Cátedra Internacional de Estudios Avanzados en Hidratación

I INTERNATIONAL WORKSHOP: ADVANCED STUDIES ON HYDRATION

Relación entre el estado de hidratación y el rendimiento escolar

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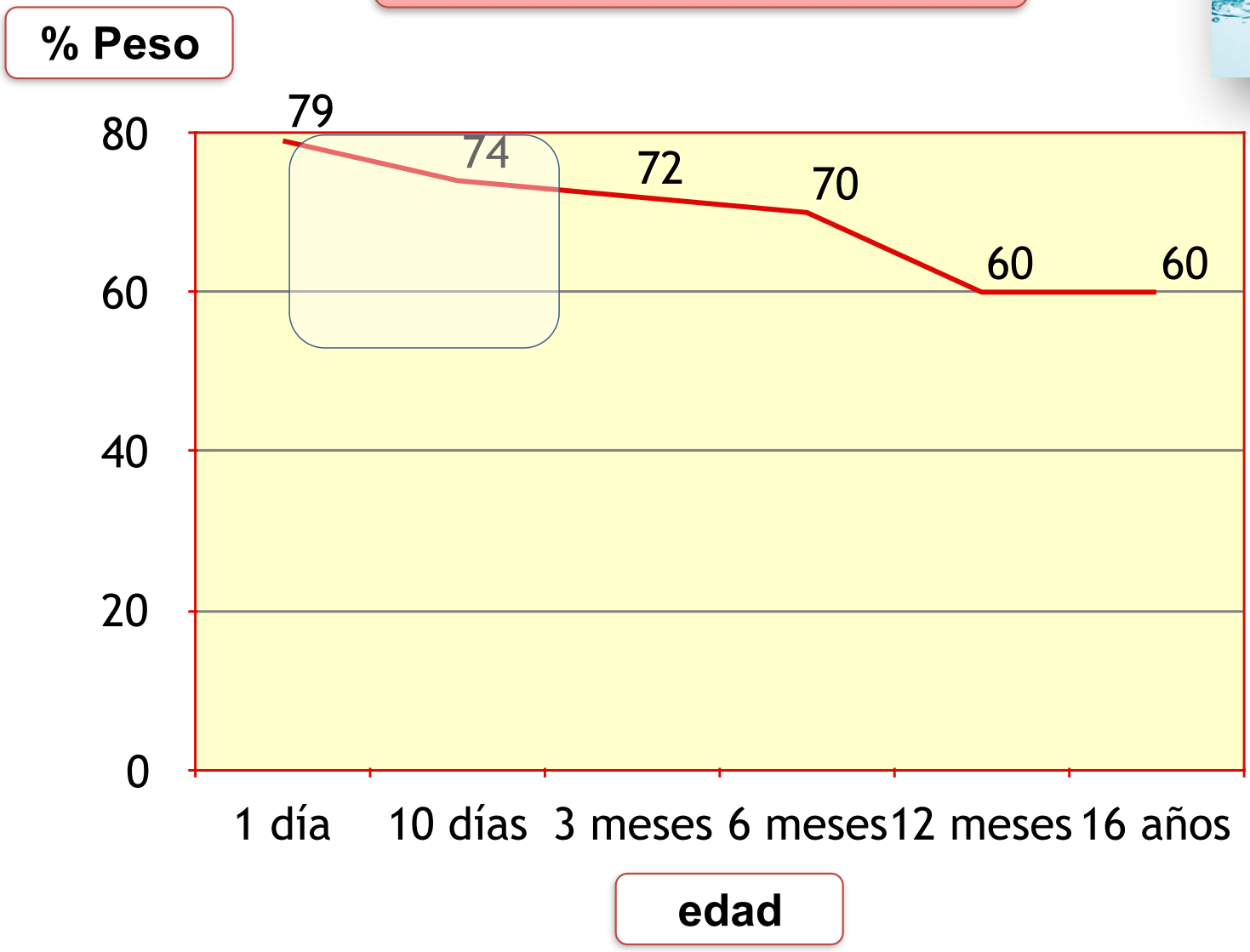
19th – 20th January 2017, Gran Canaria Meeting

Agua corporal total



Frins-Hansen. BJ. *Acta Paediatr Scand*. 1957;Suppl 110:46

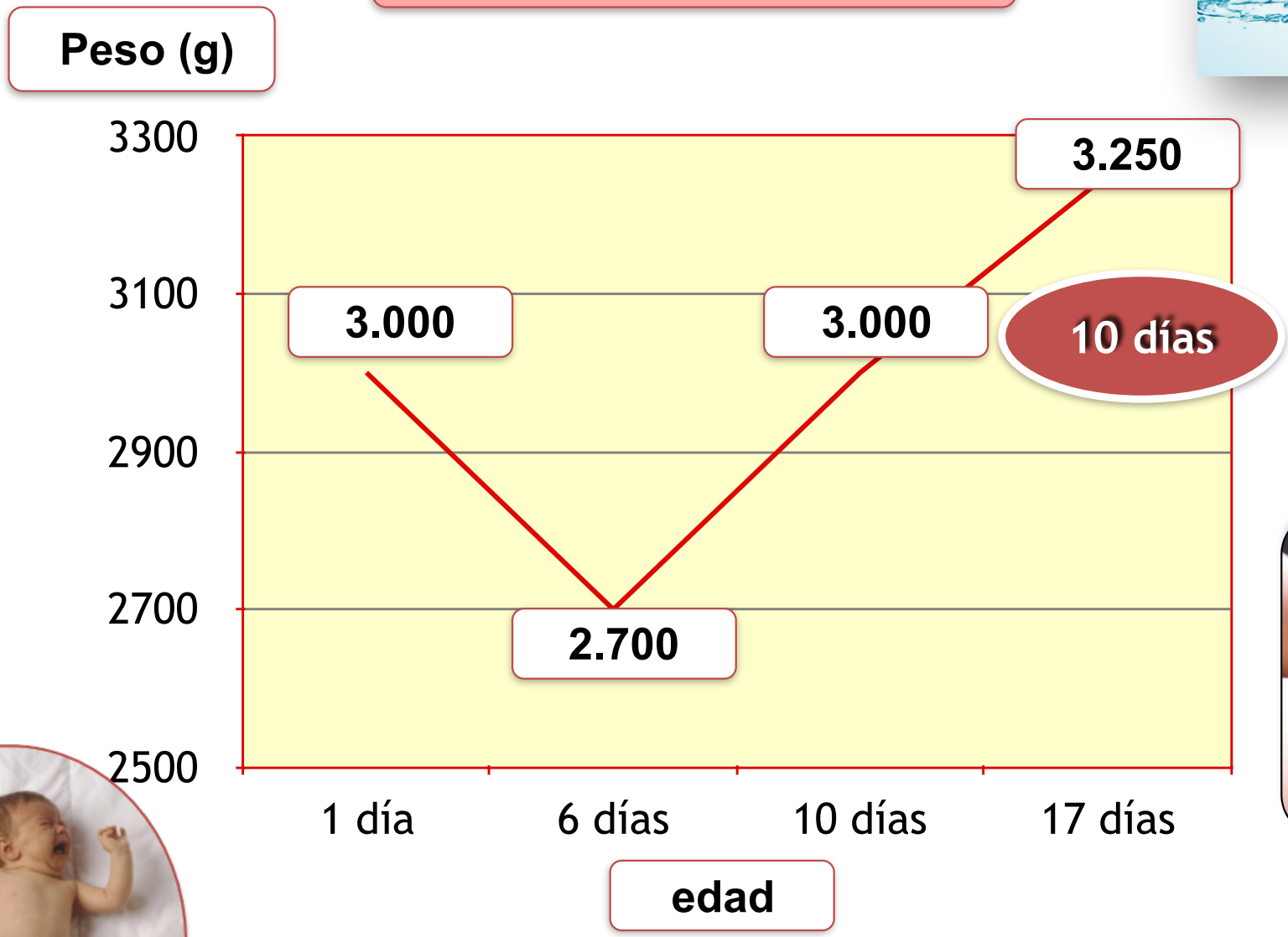
Edad	Agua total	Agua extracelular	Agua intracelular	AE/AI
0-1 días	79	44	35	1,25
1-10 días	74	40	34	1,15
1-3 meses	72	32	40	0,80
3-6 meses	70	30	40	0,75
6-12 meses	60	27	33	0,83
1-16 años	62-58	25-18	39-33	0,77– 0,5

•Friss-Hansen. BJ. *Acta Paediatr Scand.* 1957;Suppl 110:46

•Friss-Hansen BJ,et al. Total body water in children. *Pediatrics*.1961; 7:321-7.

•Wells JC et al. Prediction of total body water in infants and children. *Arch Dis Child*. 2005;90:965-71

La regla de los 10



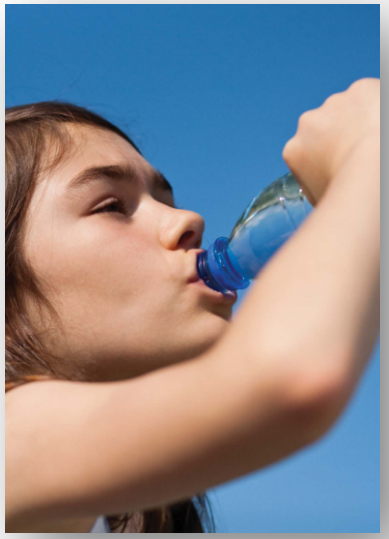
Balance del agua en el niño

- Aportes
  - Agua de bebida
  - Agua de los alimentos
  - Agua de oxidación
- Pérdidas
  - Orina
  - Insensibles
  - Sudor
  - Heces

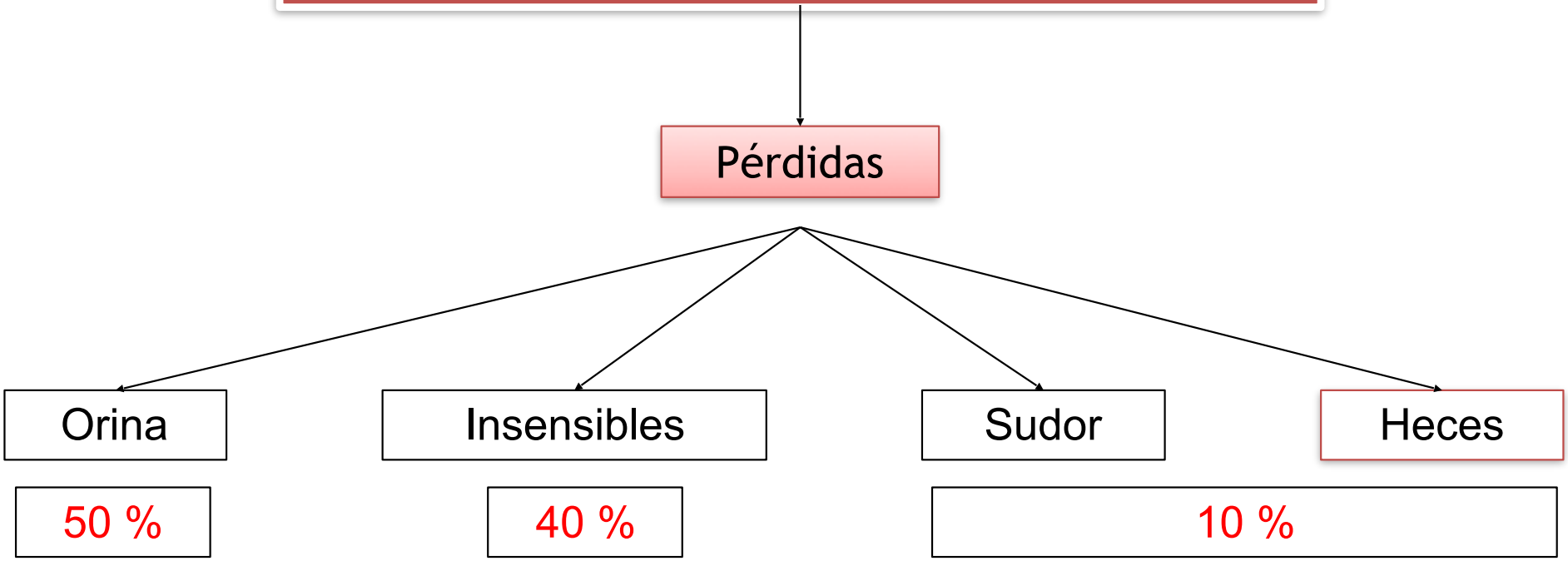
Balance del agua en el niño

Aportes

- Agua de bebida
- Agua de los alimentos
- Agua de oxidación



Balance del agua en el niño

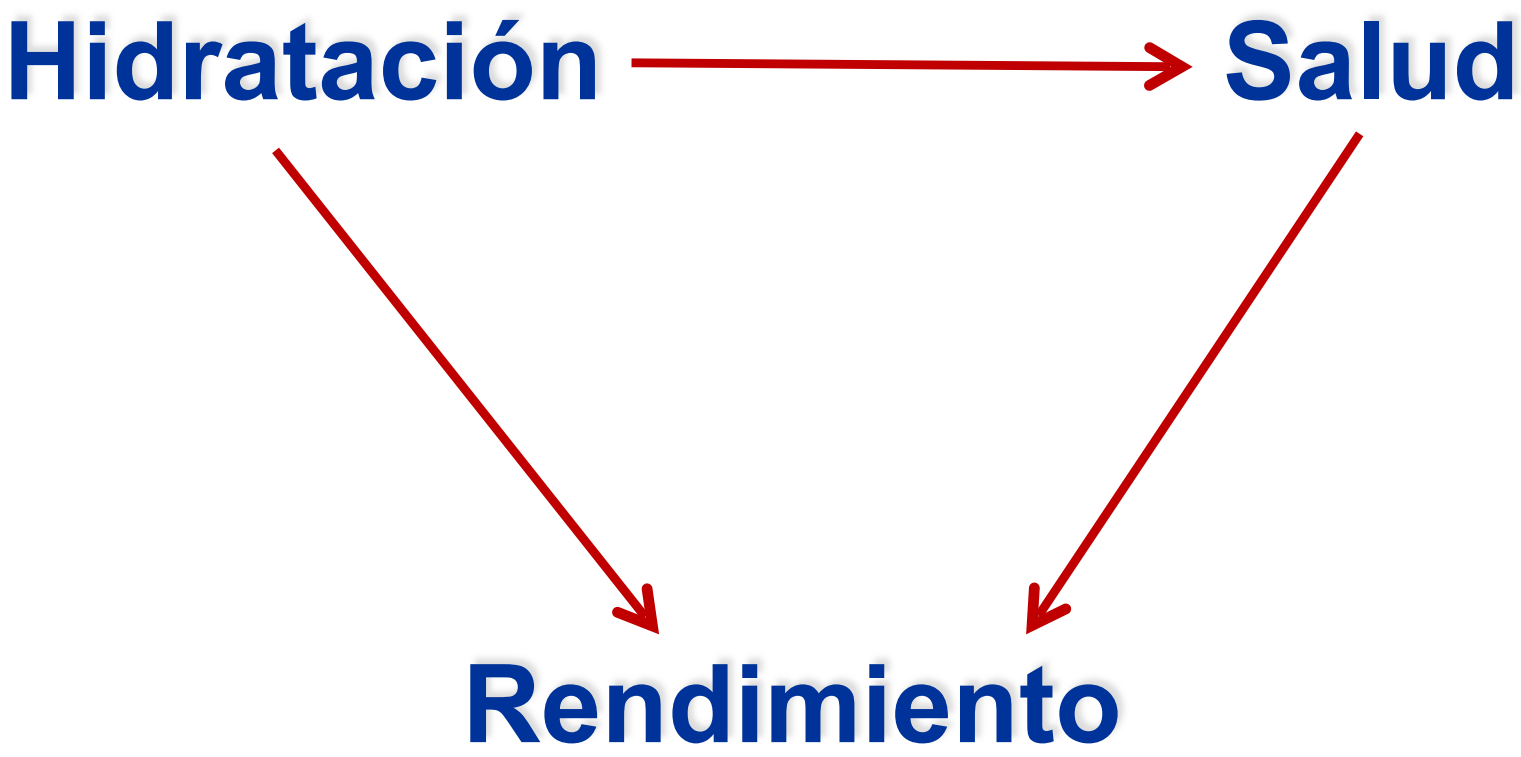


Agua para el crecimiento
10 – 12 ml/Kg/día

Ingestas adecuadas de agua (AI)
DRI- National Academy Press 2004

Varón				Mujer		
Alimentos	Agua	***Total***	Edad	Alimentos	Agua	***Total***
0.0	0.7	**0.7***	0 – 6 m	0.0	0.7	**0.7***
0.2	0.6	**0.8***	7-12 m	0.2	0.6	**0.8***
0.4	0.9	**1.3****	1 -3 a	0.4	0.9	**1.3****
0.5	1.2	**1.7****	4 – 8 a	0.5	1.2	**1.7****
0.6	1.8	**2.4****	9 – 13 a	0.5	1.6	**2.1****
0.7	2.6	**3.3****	14 – 18 a	0.5	1.8	**2.3****

Base de cálculo:
* Lactancia materna (0,78 l /día* 0,87 % agua) y (0,6 l/d*0,87 % + 0,32 l/d)
** NHANES III -National Center for Health Statistics
Third National Health and Nutrition Examination Survey, 1988–1994


Hidratación
Salud
Rendimiento

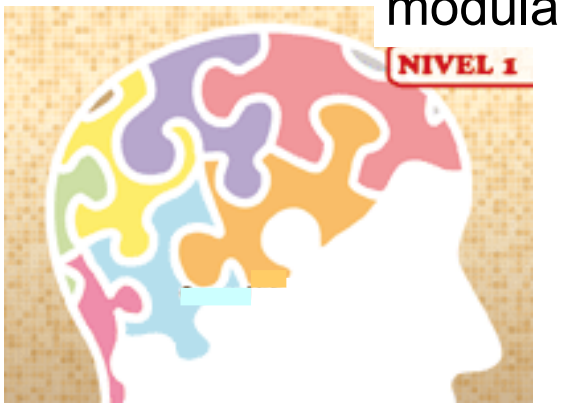
Rendimiento escolar

Rendimiento escolar

Depende de aspectos diferentes:

- -Memoria
- -Atención
- -Inteligencia
- -Lenguaje

Hidratación juega influencia moduladora



Agua: Función a nivel cerebral

Para el adecuado funciona del cerebro es necesario una correcta hidratación

Lieberman HR. Hydration and cognition: a critical review and recommendations for future research. *J Am Coll Nutr*. 2007;26(5 Suppl):555S-561S.

Puntos a tratar

-Riesgo de deshidratación en niños

-Estado de hidratación de escolares españoles

-Influencia de la hidratación en el rendimiento

Riesgo de deshidratación en niños

Factores que afectan los requerimientos hídricos del niño

- < Tolerancia al calor
- > Relación área superficie-masa corporal
- < Capacidad sudoración
- Gasto cardiaco inferior a un nivel metabólico dado
- Tardan más en aclimatarse
- Tasa metabólica más alta durante la actividad física

Factores que afectan los requerimientos hídricos del niño

- Dependen de los cuidadores para la ingesta de alimentos y fluidos
- Diferentes sensibilidades para la sed
- < Capacidad de expresar la sed
- > Riesgo deshidratación voluntaria

D'Anci KE, Constant F, Rosenberg IH. **Hydration and cognitive function in children.** *Nutr Rev*. 2006 ;64:457-64.

Review

Hydration in Children

Friedrich Manz, MD

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Key words: hydration, dehydration, hypohydration, children

Water supply is a basic public problem. In modern science, three periods with different approaches to define recommended water intake in adults can be distinguished. Pediatricians agree that hydration in children may be optimal only in breastfed infants. More data are required on the health effects of different hydration states and varying water intakes in particular age and gender groups to define optimal ranges of water intake. The fetus grows in an exceptionally well-hydrated environment. Water metabolism shows several peculiarities in preterm and term infants. Infant diarrhea remains a major topic of basic and clinical research. Water intoxication in infants, toddlers, and children is rare and can only be found in exceptional circumstances. Hydration status characterized by hyponatremia may play a role in the pathogenesis of febrile convulsions in toddlers. There is increasing indirect evidence that spontaneous drinking behavior of a population may be fixed and anchored in the age range of toddlers.

Sex differences in hydration status are common, but not obligatory. What causes theses differences? What is behind the various circadian rhythms of urine osmolality in children? At what age and in what quantities can alcohol and caffeine consumption be tolerated? How can individual susceptibility be defined? Reflecting on the modern epidemic of obesity in children and adolescents, a public consensus concerning use and misuse of sweetened drinks seems mandatory. Dietary reference intakes of water refer to 24-hour intake. In nutritional counselling, food and meal-based dietary advice is primarily given. Young parents are confronted with a flood of advice of varying quality. Recommendations on fluid consumption should be collated and revised.

Key teaching points:

- Preterm infants show several peculiarities of water metabolism and the available techniques to measure body composition of preterm infants only allow comparisons between groups, not long-term observations of individuals.
- Individual, familial, and cultural hydration status, characterized by free water reserve, differs remarkably in children.
- While based on correct observation at the time, much of the common popular public opinion regarding health advice concerning fluid intake has been proven wrong from a modern day perspective.

INTRODUCTION

There are now established daily reference values for most essential nutrients. These vary enormously in the precision with which they have been calculated and are constantly undergoing revision. Interestingly, water, the quantitatively most important and most essential nutrient (defining "most essential" as the one whose lack would result in death the fastest), has no generally promoted dietary reference intake values [1]. Differences such as climate, physical activity, and renal solute load and the lack of a generally accepted marker of euhydration make characterizing individual hydration status and defining an adequate total water intake difficult. Thus, the role of different states of hydration status in the pathophysiology of different morbidities is not well delineated.

In this survey, several topics of interest concerning hydration in healthy infants and children are presented. Effects of different dehydration stages on exercise performance, wellness, cognitive function, and mental performance (such as reduced alertness and ability to concentrate and tiredness and headaches) will be discussed by other authors in this supplement.

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Presented at the ILSI North America Conference on Hydration and Health Promotion, November 29–30, 2006 in Washington DC.

Conflict of Interest Disclosure: There are no conflicts of interest to declare in connection with this work.

NIÑOS:

> Necesidades hídricas en relación al peso corporal

> Susceptibilidad a pérdida de fluídos

> Riesgo deshidratación

Estado de hidratación de escolares españoles

Hábitos de hidratación de niños en función de sus pautas de actividad

Revista Española de
Nutrición Comunitaria
Spanish Journal of Community Nutrition

Rev Esp Nutr Comunitaria 2014;20(Supl. 1):41-48
ISSN 1135-3074

Water intake adequacy and dietary sources in schoolchildren from Madrid by physical activity level

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[1]Faculty of Health Sciences. Alfonso X El Sabio University. Villanueva de la Cañada. Madrid. [2]Department of Nutrition, Faculty of Pharmacy, Complutense University of Madrid. [3]UCM Research Group VALORNUT (920030). Department of Nutrition. Faculty of Pharmacy. Complutense University of Madrid. Spain.

Abstract

Introduction: Inadequate fluid intake may contribute to lower cognitive and exercise performance in children.

Objective: To evaluate the adequacy of water intake and dietary sources in schoolchildren from the Community of Madrid by physical activity level.

Methods: 564 schoolchildren (258 boys and 306 girls) aged between 9 and 12 were studied. Dietary data was obtained by applying a food intake record (3 days) and the weighing method. Water intake was compared with the adequate intake established by the EFSA. Physical activity level was obtained by applying a questionnaire and criteria established by IOM. All calculations were made using SPSS (v19.0) and statistical significance was set at $p < 0.05$.

Results: Three point five percent of schoolchildren had a sedentary level (S), 77.7% had a low active level (LA) and 18.8% had an active level (A). Mean total water intake was 1,504.6 ± 329.35 mL/day (S: 1,526.3 ± 386.05 mL/day, LA: 1,504.8 ± 326.17 s and A: 1,499.3 ± 334.27 mL/day; $p > 0.05$). Ninety-one percent of the studied children did not meet the adequate intake for total water intake (S: 90%, LA: 91.1% and A: 90.6%; $p > 0.05$). The major dietary sources were beverages (S: 48.92%, LA: 40.05%, A: 38.63%), dairy

ADECUACIÓN DE LA INGESTA DE AGUA Y FUENTES DIETÉTICAS EN ESCOLARES DE MADRID EN FUNCIÓN DEL NIVEL DE ACTIVIDAD FÍSICA

Resumen

Introducción: El consumo inadecuado de líquidos puede provocar un menor rendimiento cognitivo y deportivo en los niños.

Objetivo: Evaluar la adecuación de la ingesta de agua y determinar sus fuentes dietéticas en escolares de la Comunidad de Madrid en función del nivel de actividad física.

Material y Métodos: Se estudiaron 564 escolares (258 varones y 306 niñas) de 9 a 12 años. La ingesta de agua y las fuentes dietéticas se obtuvieron aplicando el registro de consumo de alimentos durante 3 días y por pesada precisa. La ingesta de agua se comparó con la ingesta adecuada propuesta por la EFSA. El nivel de actividad física se obtuvo aplicando un cuestionario y los criterios establecidos por el IOM. El análisis estadístico se realizó mediante el SPSS (versión 19.0). Se consideran significativas las diferencias con $p < 0,05$.

Resultados: El 3,5% de los escolares estudiados fueron

64 escolares (258 varones y 306 niñas)
de 9 a 12 años

3.5% Sedentarios (n=20)

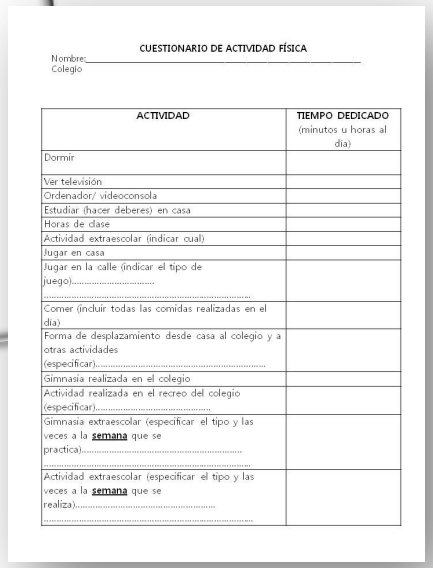
77.7% Poco activos (n=438)

18.8% Activos (n=106)

Métodos

Nivel actividad física (PAL)

Questionnaire of physical activity



CUESTIONARIO DE ACTIVIDAD FÍSICA

Nombre:_____
Colegio

ACTIVIDAD	TIEMPO DEDICADO (minutos u horas al día)
Dormir	
Ver televisión	
Ordenador/ videoconsola	
Estudiar (hacer deberes) en casa	
Horas de clase	
Actividad extraescolar (indicar cual)	
Jugar en casa	
Jugar en la calle (indicar el tipo de juego).....	
Comer (incluir todas las comidas realizadas en el día)	
Forma de desplazamiento desde casa al colegio y a otras actividades (especificar).....	
Gimnasia realizada en el colegio	
Actividad realizada en el recreo del colegio (especificar).....	
Gimnasia extraescolar (especificar el tipo y las veces a la **semana** que se practica).....	
Actividad extraescolar (especificar el tipo y las veces a la **semana** que se realiza).....	

Ortega et al. 2006

Classification by physical activity level	
Sedentary	≥ 1.0 - <1.4
Low active	≥ 1.4 - <1.6
Active	≥ 1.6 - <1.9
Very active	≥ 1.9 - <2.5

Institute of Medicine, 2005

Hábitos de hidratación de niños en función de sus pautas de actividad

Water intake data of the schoolchildren. Differences by physical activity level

	Sedentary (n = 20)	*Low active (n = 438)*	*Active (n = 106)*
Energy intake (kcal/day)	2,057.5 ± 394.27	2,132.6 ± 349.09	2202.6 ± 350.41
Estimated energy requirement (kcal/day)	1,854.5 ± 274.6	2,063.4 ± 315.32	2426.0 ± 395.78[a]*[b]***[c]***
Energy intake adequacy (%)	113.23 ± 27.33	105.31 ± 21.31	92.54 ± 18.36[b]**[c]***
Total water intake (mL/day)†	1,526.3 ± 386.05	1,504.8 ± 326.17	1499.3 ± 334.27
Total water intake adequacy (%)[1]	74.03 ± 25.94	75.53 ± 19.28	76.11 ± 17.99
% total water intake < AI[1]	90.0	91.1	90.6
Water intake from beverages (mL/day)ǂ†	741.99 ± 371.79	602.66 ± 292.84	578.80 ± 284.06
Water intake from beverages adequacy (%)[1]	51.80 ± 30.21	43.16 ± 21.50	41.96 ± 20.59
% water intake from beverages < AI[1]	95.0	97.9	98.1

Values are expressed as mean and SD or %. Differences by physical activity level: [a]sedentary *vs* low active, [b]sedentary *vs* active, [c]low active *vs* active. *p < 0.05, **p < 0.01, *** p < 0.001.

ǂ Beverages not include milk or dairy drinks.

† Data adjusted for total energy intake.

[1] Adequate intake (AI) for children by EFSA[14].

(2.1 L/día en niños y 1,9 L/día en niñas)

-González Rodríguez LG, López-Sobaler AM, Aparicio A, Ortega RM. Water intake adequacy and dietary sources in schoolchildren from Madrid by physical activity level. Rev Esp Nutr Comunitaria 2014;20(Supl. 1):41-48.

Hábitos de hidratación de niños en función de sus pautas de actividad

Water dietary sources of the studied schoolchildren with different physical activity level

	Total	*Sedentary (n = 20)*	*Low active (n = 438)*	*Active (n = 106)*
Cereals	2.59	2.69	2.58	2.61
Pulses	0.18	0.16	0.15	0.32
Vegetables	9.35	8.74	9.38	9.34
Fruits	10.64	7.98	10.69	10.93
Dairy products	27.13	22.45	27.06	28.26
Meat	6.01	5.42	5.96	6.31
Fish	1.79	1.84	1.88	1.42
Eggs	1.41	0.97	1.43	1.39
Sugars, sweets and pastries	0.07	0.05	0.07	0.05
Oils	0.01	0.01	0.02	0.01
Beverages	38.63	48.92	40.05	38.63
Precooked food	0.49	0.32	0.49	0.49
Appetizers	0.07	0.18	0.08	0.07
Condiments and sauces	0.17	0.26	0.17	0.17

Values are expressed as percentages.

-González Rodríguez LG, López-Sobaler AM, Aparicio A, Ortega RM. Water intake adequacy and dietary sources in schoolchildren from Madrid by physical activity level. Rev Esp Nutr Comunitaria 2014;20(Supl. 1):41-48.

Hidratación y función cognitiva

Hidratación y función cognitiva

- **Adultos: Una deshidratación leve (pérdidas del 1% al 2% del peso debidas a falta de líquidos) puede impedir la capacidad de concentración**

- **Pérdidas superiores al 2% pueden afectar a las habilidades de procesamiento y debilitar la memoria reciente**

Lieberman HR. Hydration and cognition: a critical review and recommendations for future research. *J Am Coll Nutr.* 2007;26(5 Suppl):555S-561S.

Grados de deshidratación

- CDC's 1992 y AAP 1996:
  - DH leve (3%-5%)
  - Moderada (6%-9%)
  - Grave (>10%, shock o cerca del mismo)
- WHO 1995 y ESPGHAN 2001:
  - Sin signos DH (<3%-5%)
  - Algún signo DH (5%-10%)
  - DH grave (>10%)

Grados de deshidratación

- Los 1º signos de DH no suelen ser evidentes hasta pérdidas del 3-8%

- Los signos más específicos de DH moderada fueron: alteración neurológica/comportamiento y ojos hundidos

Duggan C, et al. How valid are clinical signs of dehydration in infants? J Pediatr Gastroenterol Nutr 1996;22:56-61.

October 2006: (l)457–464

Hydration and Cognitive Function in Children

Kristen E. D'Anci, PhD, Florence Constant, MD, PhD, and Irwin H. Rosenberg, MD

Adequate fluid intake is critical for survival. While adults are at liberty to drink fluids as wanted, children and infants are dependent upon caregivers for food and fluid. Children are at greater risk for dehydration than adults due to their higher surface-to-mass ratio. Additionally, children have different thirst sensitivities and body cooling mechanisms than adults. Children differ from adults in total body water content, and boys and girls differ in body water content with maturation. Research in young adults shows that mild dehydration corresponding to only 1% to 2% of body weight loss can lead to significant impairment in cognitive function. Dehydration in infants is associated with confusion, irritability, and lethargy; in children, it may produce decrements in cognitive performance.

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doi: 10.1301/nr.2006.oct.457–464

Key words: children, cognitive function, hydration

INTRODUCTION

Water and fluid balance in humans is sharply regulated and complex. People drink liquids not only in response to physiological thirst, but also in response to a variety of cultural, social, and psychological factors. The type and amount of fluid consumed is dependent upon relative palatability and temperature of the fluid, meal type and size, and water safety and availability. Fluid intakes generally are considered to be adequate to maintain fluid balance in most people. Moreover, cultural patterns of fluid intake are sufficient to override a true physiological thirst. Risk for dehydration, therefore, arises under special circumstances such as illness, injury, heat stress, or physical activity, and also according to age. Indeed, fluid requirements relative to body weight are greatest during the early neonatal period and through childhood. As a consequence, children may be more susceptible to fluid losses and are therefore at greater risk for dehydration than are adults.

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Please address all correspondence to: Irwin H. Rosenberg, MD, Nutrition and Neurocognition Laboratory, Jean Mayer USDA Human Nutrition Research Center on Aging, 711 Washington Street, Boston, MA 02111; Phone: 617-556-3331; Fax: 617-556-3243; E-mail: irwin.rosenberg@tufts.edu.

WATER BALANCE

The balance between loss and gain of fluids maintains body water within relatively narrow limits.[1] The routes of water loss from the body are the urinary system, the skin, the respiratory surfaces, and the gastrointestinal tract. The primary avenues for restoration of water balance are fluid and food ingestion, with water oxidation making a minor contribution.[2] The volumes of water that individuals obtain from drinks and food are highly variable, although it is generally reported that the majority normally comes from liquids.[3]

Thirst and Water Intake Regulation

The act of drinking may not be directly involved with a physiological need for water intake, but can be initiated by habit, ritual, taste, or a desire for a warm or cooling effect.[4] A number of the sensations associated with thirst are learned, with signals such as dryness of the mouth or throat inducing drinking, while distension of the stomach can stop ingestion before a fluid deficit has been restored. However, the underlying regulation of thirst is controlled separately by the osmotic pressure and volume of the body fluids, and as such is regulated by the same mechanisms that affect water and solute reabsorption in the kidneys and control central blood pressure. Despite large variations in salt and water intake, homeostatic mechanisms maintain a normal plasma osmolality of 275 to 290 mOsm/kg and a normal sodium level between 135 and 145 mEq/L.

Water is excreted from the body through urine and by insensible losses such as respiration and evaporation

DESHIDRATACIÓN:

- Lactantes: Confusión, irritabilidad y letargia

- Niños: < Rendimiento cognitivo

Efectos de la deshidratación en la función cognitiva

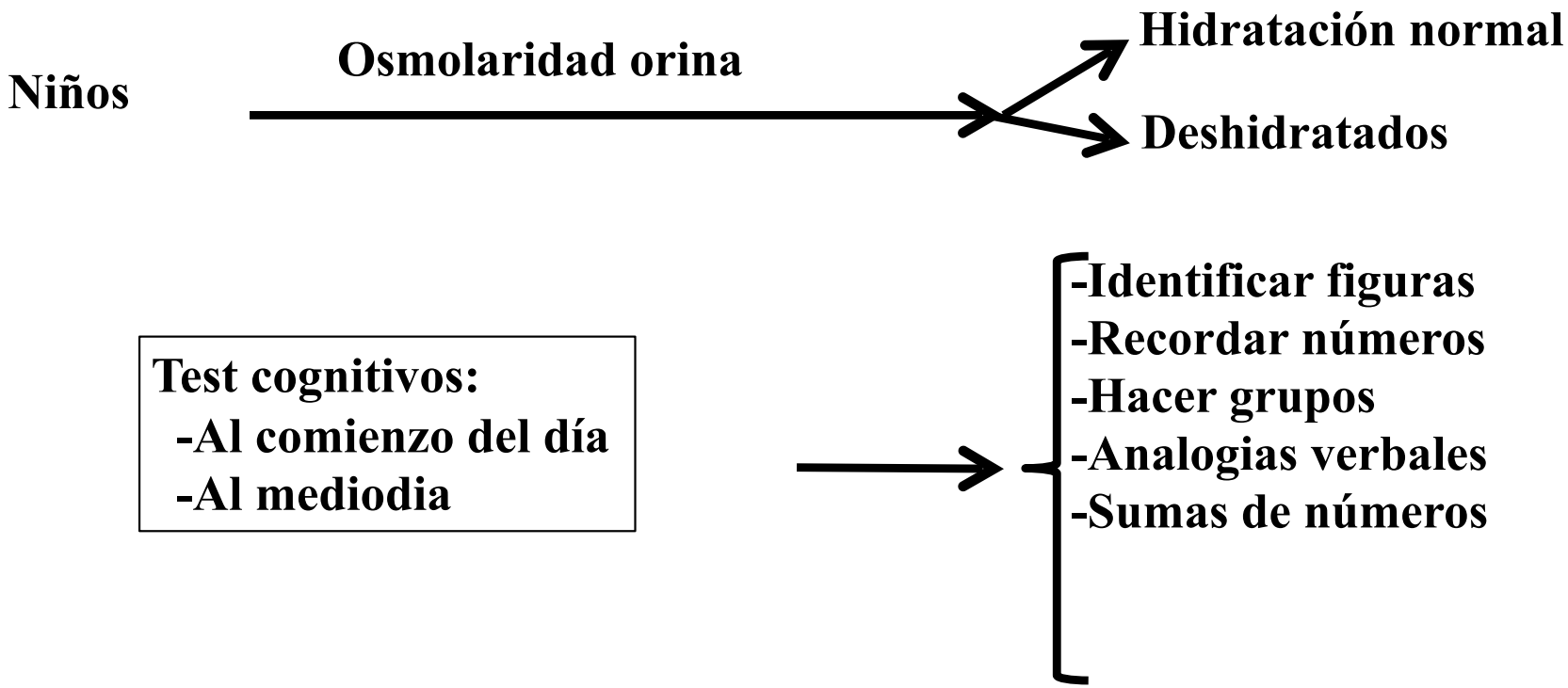
- ❑ **Insuficientemente estudiados**
- ❑ **Evaluación difícil:**
  - **- Deshidratación**
  - **- Función cognitiva (> tests)**
- ❑ **Pocos estudios en niños**

Maughan RJ: Impact of mild dehydration on wellness and on exercise performance. *Eur J Clin Nutr*. 2003; 57:S19–S23.

Wilson MM, Morley JE: Impaired cognitive function and mental performance in mild dehydration. *Eur J Clin Nutr*. 2003; 57:S24–S29.

Hidratación y función cognitiva en niños

Estudio de deshidratación voluntaria en niños (10-12 años) para analizar si tiene impacto negativo en función cognitiva.



Bar-David Y, Urkin J, Kozminsky E. The effect of voluntary dehydration on cognitive functions of elementary school children. *Acta Paediatrica.* 2005; 94:1667–1673.

Hidratación y función cognitiva en niños

Resultados

55% deshidratados (osmolaridad urinaria > 800 mosm/kg H(2)O)

-No diferencias en el rendimiento cognitivo al comienzo del día

- Al mediodía: Mejores test cognitivos (4 de 5) en el grupo hidratado (p=0.025)

CONCLUSIÓN: Deshidratación voluntaria es frecuente en niños escolares y afecta negativamente a las funciones cognitivas

Bar-David Y, Urkin J, Kozminsky E. The effect of voluntary dehydration on cognitive functions of elementary school children. *Acta Paediatrica*. 2005; 94:1667–1673.

Hidratación y función cognitiva en niños

Appetite 95 (2015) 520–527

Contents lists available at ScienceDirect

Appetite

journal homepage: www.elsevier.com/locate/appet

Research report

Hydration status moderates the effects of drinking water on children's cognitive performance

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ABSTRACT

Changes in hydration status throughout the day may affect cognitive performance with implications for learning success in the classroom. Our study tested the hypothesis that the benefit of drinking water on working memory and attention depends upon children's hydration status and renal response to water intake. Fifty-two children aged 9–12 years old were tested under two experimental conditions. The treatment session (Water session) consisted of a standard breakfast with 200 ml water, a baseline test, consumption of 750 ml of water over a period of two hours and subsequently retested. No water was

Perry CS 3rd, Rapinett G, Glaser NS, Ghetti S. Hydration status moderates the effects of drinking water on children's cognitive performance. *Appetite*. 2015 ;95:520-7.

Working memory
Attention

exhibited larger decreases in urine osmolality following water intake performed better on the control day compared to the water day on the digit-span task and pair-cancellation task. These results suggest that focusing on adequate hydration over time may be key for cognitive enhancement.

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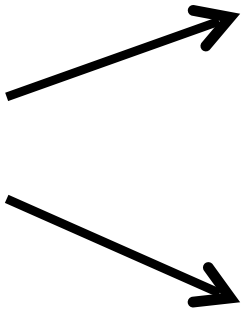
Hidratación y función cognitiva en niños

Hipótesis: El beneficio de la ingesta de agua sobre la memoria y la atención depende del estado de hidratación y de la respuesta renal

52 niños (9-12 años)



Sesión tratamiento con agua: Desayuno estándard con 200 ml de agua y test cognitivo. 2 horas después ingesta de 750 ml de agua y repetición del test

Sesión control sin ingesta posterior de agua

- Cambios en la hidratación fueron evaluados por analítica urinaria

Perry CS 3rd, Rapinett G, Glaser NS, Ghetti S. Hydration status moderates the effects of drinking water on children's cognitive performance. *Appetite*. 2015 ;95:520-7.

Hidratación y función cognitiva en niños

- Mejor test cognitivo en la sesión de tratamiento con agua

Mejor hidratados

- Mejor test cognitivo en la sesión control

Peor hidratados

Adecuada hidratación mejora la función cognitiva

Perry CS 3rd, Rapinett G, Glaser NS, Ghetti S. Hydration status moderates the effects of drinking water on children's cognitive performance. *Appetite*. 2015 ;95:520-7.

Hidratación y función cognitiva en niños

- 55 niños 7-9 años edad
- Randomización (adición o no de 211 ml agua)
- Consumo adicional de 211 ml de agua
    - Mejora el rendimiento para encontrar diferencias entre figuras
    - No diferencias en tareas visuales-motoras

Edmonds C, Buford D
Should children drink more water?.The effects of drinking water on cognition in children.
Appetite. 2009;52:776-9

Hidratación y función cognitiva en niños

- 23 niños 6-7 años edad
- 11 adición de 500 ml (media consumo 400 ml) de agua y 12 no adición
- Consumo adicional de agua
    - Mejor atención visual y búsqueda visual
    - No diferencias en memoria visual y rendimiento visual

Edmonds CJ, Jeffes B.
Does having a drink help you think? 6-7-Year-old children show improvements in cognitive performance from baseline to test after having a drink of water.
Appetite. 2009 ;53:469-72

Estudios de intervención

40 niños (edad media de 8’5 años): Se valora su memoria (preguntando por los objetos que aparecen en un dibujo) en dos condiciones:

-Después de haber consumido 300 mL de agua (20-50 min antes de hacer el test)
-Sin aporte de agua

Todos reciben en la comida 200 mL de agua (12-13 h) y tienen acceso libre a fuentes

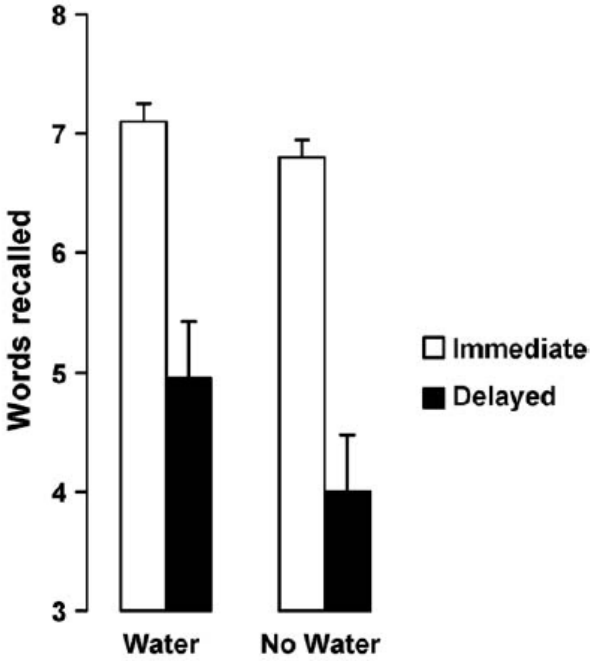


Fig. 1. The influence of drinking water on memory. The data are the mean number of objects recalled ± standard error for a sample of 40 children. Memory was significantly better on the occasions when water had been consumed (main effect for consumption of water $F(1,36) = 4.84$, $p < 0.03$).

Los resultados fueron mejores cuando se suministró agua

Benton, D.; Burgess, N. The effect of the consumption of water on the memory and attention of children. *Appetite* ***2009, 53, 143–146.***

APARICIO A, ORTEGA RM y col. Total body water, water intake and cognitive function in children aged 8-9 years. International Journal of Community Nutrition Vol. 0 (Supplement): November 2014, pg. 206.

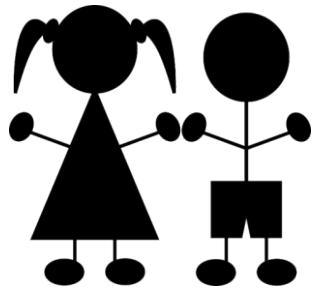
III World Congress of Public Health Nutrition

Objetivos

Analizar la relación entre la ingesta de agua, el agua corporal total y la función cognitiva en un grupo de escolares

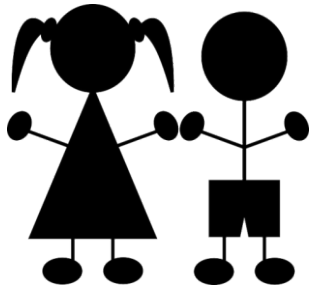
Material y métodos

97 escolares españoles (8-9 años)



APARICIO A, ORTEGA RM y col., 2014

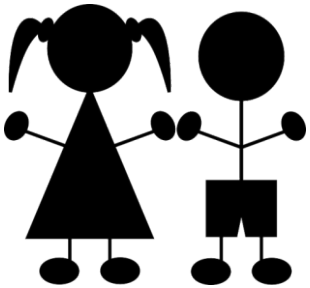
Material y métodos



- Dieta: Registro de 3 días (de jueves a domingo) → Ingesta total de agua (comida y bebida)
- Impedancia Bioléctrica → Agua corporal total (TBW)
- Test de atención D2 → Función cognitiva

APARICIO A, ORTEGA RM y col., 2014

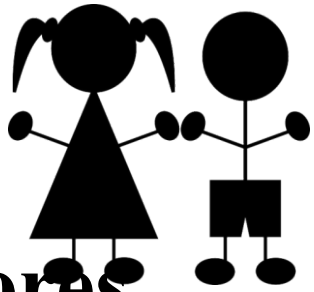
Resultados



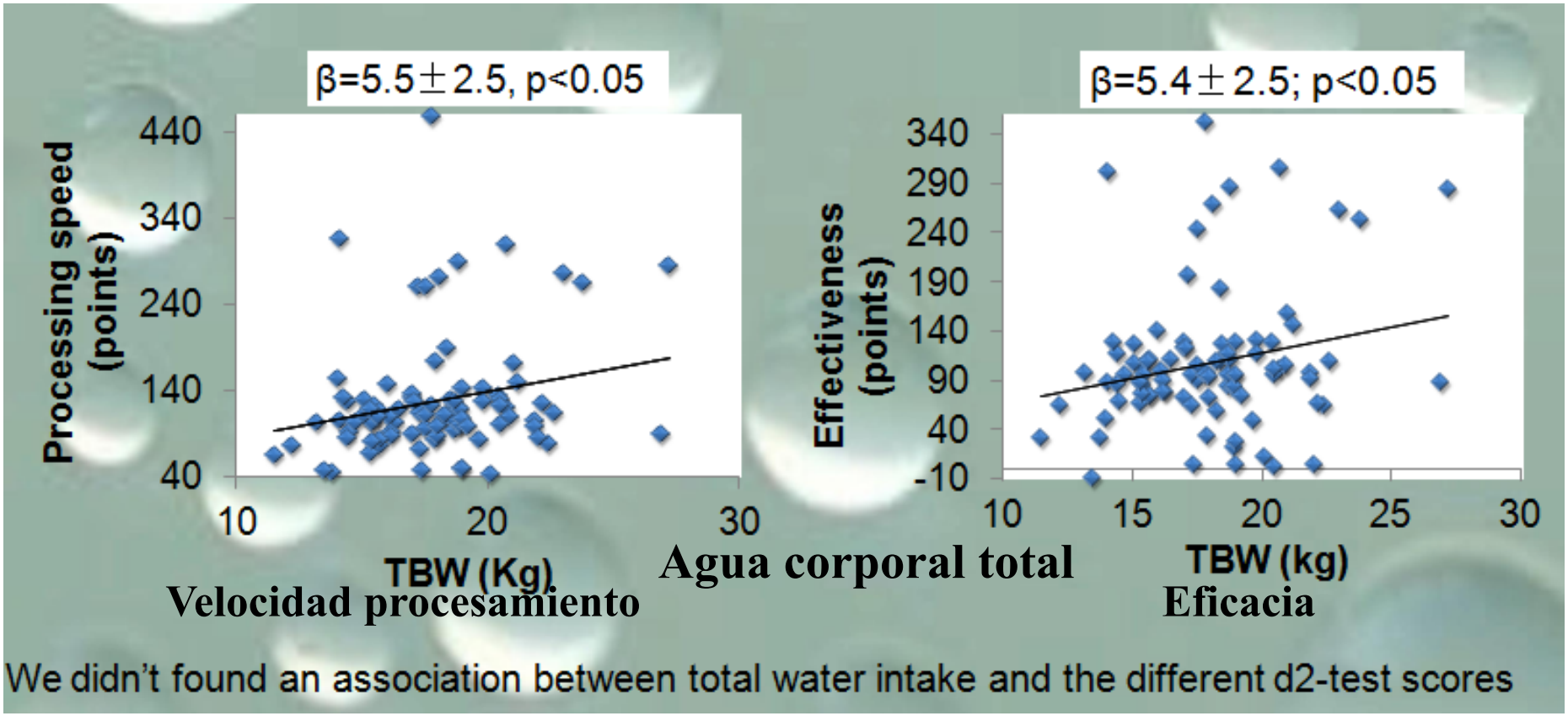
80.4% de los participantes no cubrían los requerimientos aconsejados de agua

APARICIO A, DELGADO-LOSADA ML, MASCARAQUE M, CUADRADO E, RODRÍGUEZ A, ORTEGA RM. Total body water, water intake and cognitive function in children aged 8-9 years. International Journal of Community Nutrition Vol. 0 (Supplement): November 2014, pg. 206.

Resultados

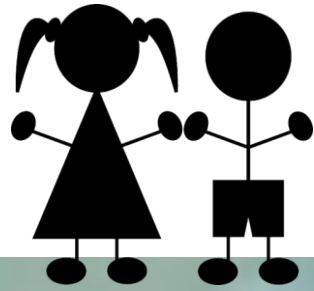


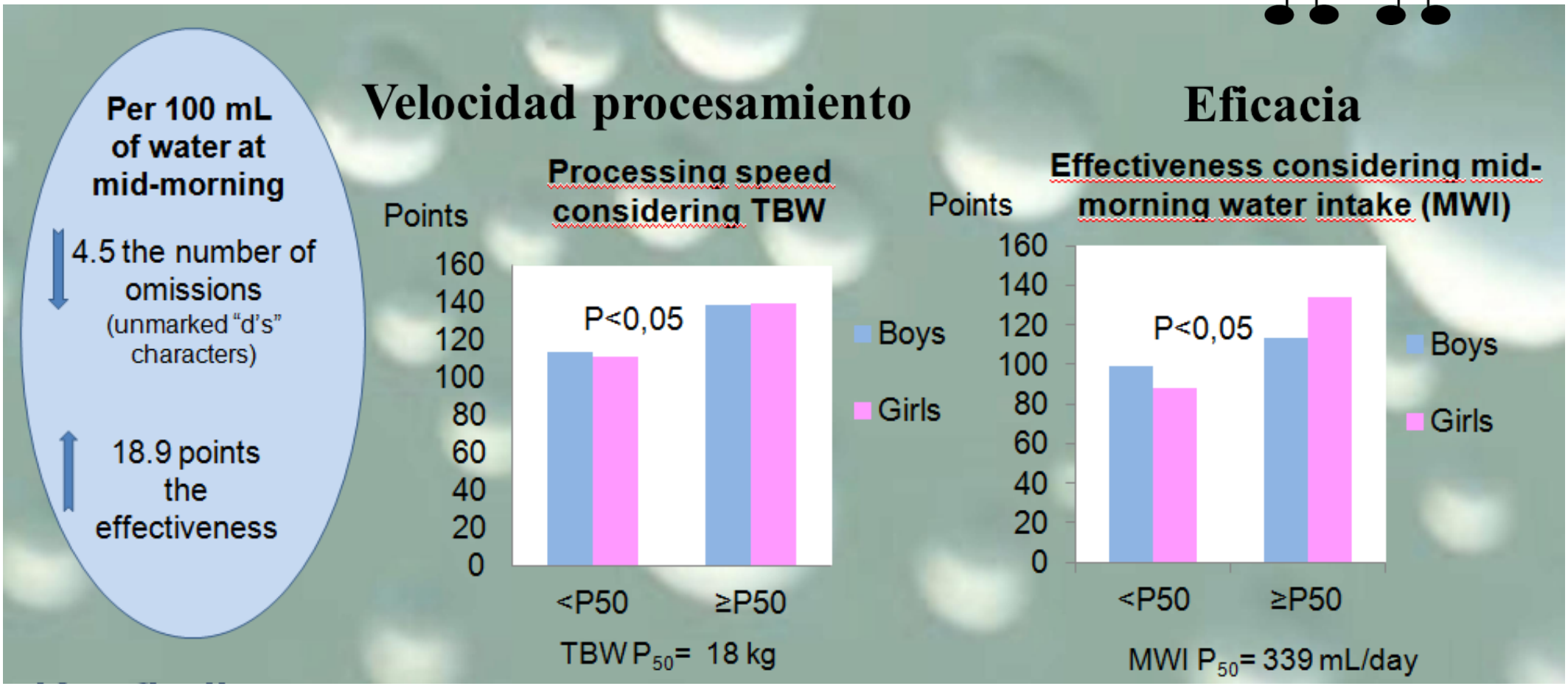
Correlation between TBW and "d2-test" scores



APARICIO A, DELGADO-LOSADA ML, MASCARAQUE M, CUADRADO E, RODRÍGUEZ A, ORTEGA RM. Total body water, water intake and cognitive function in children aged 8-9 years. International Journal of Community Nutrition Vol. 0 (Supplement): November 2014, pg. 206.

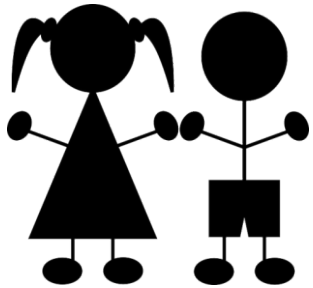
Resultados





APARICIO A, DELGADO-LOSADA ML, MASCARAQUE M, CUADRADO E, RODRÍGUEZ A, ORTEGA RM. Total body water, water intake and cognitive function in children aged 8-9 years. International Journal of Community Nutrition Vol. 0 (Supplement): November 2014, pg. 206.

Key findings



El agua corporal total baja y una inadecuada ingesta de agua a media mañana puede afectar negativamente a algunas habilidades cognitivas, que pueden afectar al rendimiento escolar

Se deben facilitar el desarrollo de estrategias eficaces para promocionar la cultura de la ingesta de agua en las escuelas

APARICIO A, DELGADO-LOSADA ML, MASCARAQUE M, CUADRADO E, RODRÍGUEZ A, ORTEGA RM. Total body water, water intake and cognitive function in children aged 8-9 years. International Journal of Community Nutrition Vol. 0 (Supplement): November 2014, pg. 206.

Hidratación y función cognitiva en niños

- Las habilidades cognitivas y los estados de ánimo están influenciados positivamente por el consumo de agua

- El impacto de la deshidratación en las funciones cognitivas y en el ánimo es particularmente relevante en los ancianos y niños, debido a su peor regulación de los fluidos

Masento NA, Golightly M, Field DT, Butler LT, van Reekum CM.
Effects of hydration status on cognitive performance and mood.
Br J Nutr. 2014;111:1841-52.

Factores responsables de la influencia de la deshidratación en la función cognitiva

-Afectación en la transmisión en sistemas monoaminérgicos

- **Noradrenalina**
- **Serotonina**
- **Dopamina**

-Cambios en la permeabilidad de la barrera hematoencefálica

-Descenso del flujo sanguíneo al cerebro

Maughan et al. *J Am Coll Nutr.* 2007; 26: 604S-612S.

D'Anci y col., Hydration and cognitive function in children. 2006

Conclusiones

- La mayoría de los estudios en niños demuestran una inadecuada ingesta de agua, independientemente de la actividad física

Ingesta de agua insuficiente

Hidratación insuficiente

↓ Función cognitiva


MUCHAS GRACIAS