

XIII ISIN CONFERENCE ON IMMUNONUTRITION
28th to 31st/OCTOBER 2024
VIRTUAL

Hydration status and its impact on secretory immunoglobulin A in firefighters

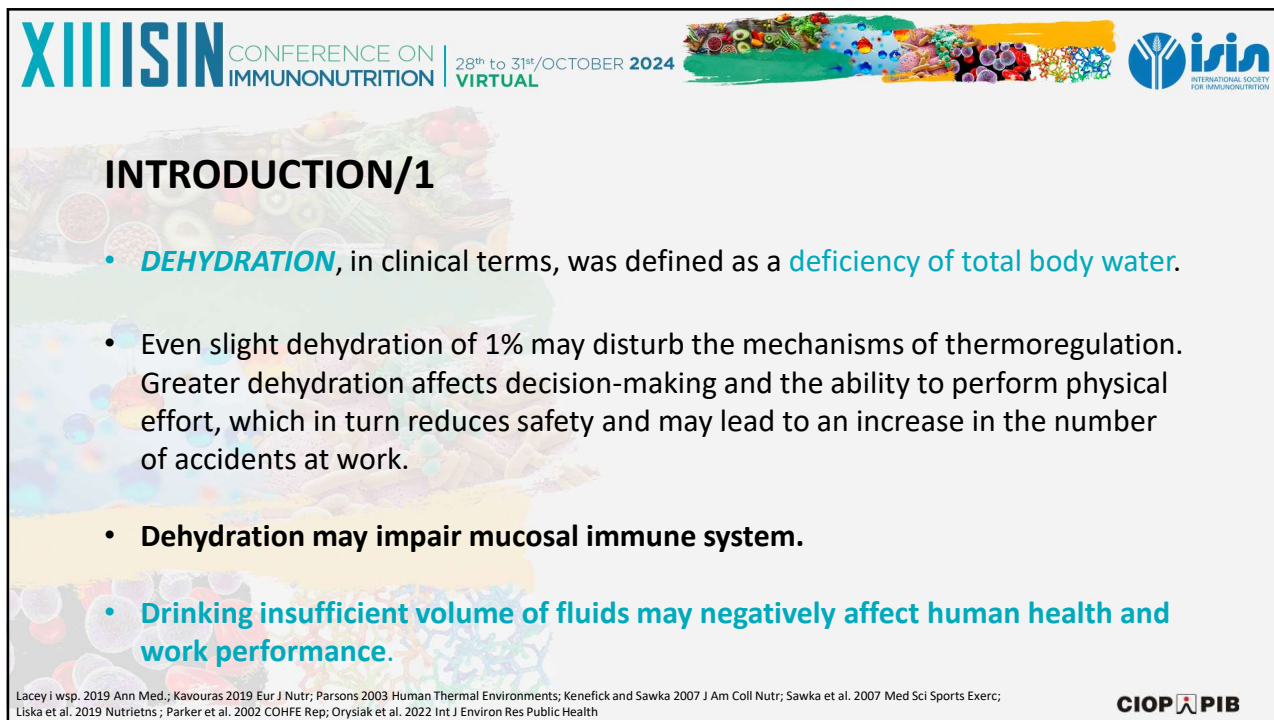
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INTRODUCTION/1

- **DEHYDRATION**, in clinical terms, was defined as a **deficiency of total body water**.
- Even slight dehydration of 1% may disturb the mechanisms of thermoregulation. Greater dehydration affects decision-making and the ability to perform physical effort, which in turn reduces safety and may lead to an increase in the number of accidents at work.
- **Dehydration may impair mucosal immune system.**
- **Drinking insufficient volume of fluids may negatively affect human health and work performance.**

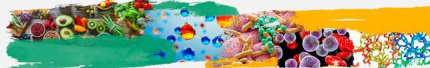

Lacey i wsp. 2019 Ann Med.; Kavouras 2019 Eur J Nutr; Parsons 2003 Human Thermal Environments; Kenefick and Sawka 2007 J Am Coll Nutr; Sawka et al. 2007 Med Sci Sports Exerc; Liska et al. 2019 Nutrients; Parker et al. 2002 COHFE Rep; Orysiak et al. 2022 Int J Environ Res Public Health

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INTRODUCTION/2

- Secretory immunoglobulin A (sIgA)** plays a key role in the mucosal immune system - the first line of defense.

Immune markers in saliva in the dehydrated state compared to the proper hydration

	Saliva flow rate	sIgA concentration	sIgA secretion rate
Fortes et al. 2012	Lower	Higher	No difference
Gill et al. 2013*	Lower (p=0.095)	Lower	Lower
Killer et al. 2015	Lower	Higher	Higher**

*Comparison: dehydrated > 3% body weight loss vs dehydrated ≤ 1.5% body weight loss
 **Only 3 hours after exercise

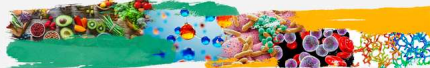

Orysiak and Mlynarczyk 2024 Bezpieczeństwo Pracy. Nauka i Praktyka; Gill et al. 2013 Appl Physiol Nutr Metab; Killer et al. 2015 Eur J Appl Physiol; Fortes et al. 2012 Appl Physiol Nutr Metab.; Orysiak et al. 2017 J Sports Sci; Orysiak et al. 2012 Biol Sport

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Results on the relationship between dehydration and immunity are inconsistent.


Orysiak and Mlynarczyk 2024 Bezpieczeństwo Pracy. Nauka i Praktyka; Gill et al. 2013 Appl Physiol Nutr Metab; Killer et al. 2015 Eur J Appl Physiol; Fortes et al. 2012 Appl Physiol Nutr Metab.; Orysiak et al. 2017 J Sports Sci; Orysiak et al. 2012 Biol Sport



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AIM


- The aim of the pilot study was to determine the relationship between **hydration status and secretory immunoglobulin A (sIgA)** in firefighters.

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MATERIALS AND METHODS

- Seventeen **firefighters** (29.7 ± 5.4 years; 179.4 ± 6.6 cm; 8.1 ± 10.7 kg).
- Saliva** and **urine** were collected in the morning before the shift in winter.
- URINE**
- Hydration status was determined based on urine specific gravity (refractometric method)
 - a result ≥ 1.020 g/ml indicated **dehydration**.



Sawka et al. 2007 Med Sci Sports Exerc;
Orysiak et al. 2022 Int J Environ Res Public Health

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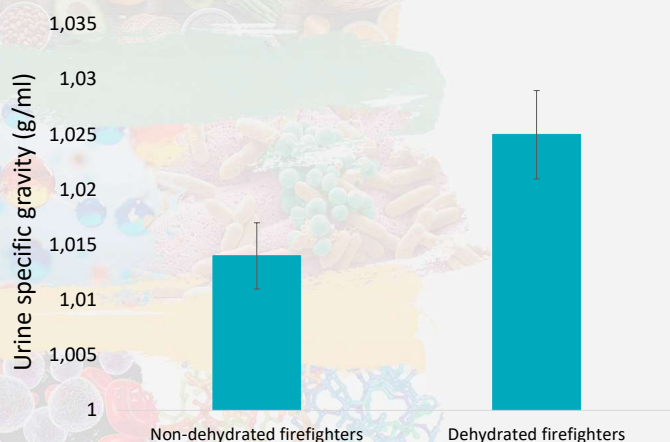


MATERIALS AND METHODS

- **SALIVA**
- The **secretory immunoglobulin A** was analysed using The Salimetrics Salivary Secretory IgA (SIgA, Secretory Immunoglobulin-A) Enzyme Immunoassay Kit.
- The **passive drool collection method** was used to collect the unstimulated whole saliva into a sterile collection tube during 5 minutes.
- The **saliva flow rate** (ml/min) was calculated by dividing the volume of saliva collected by 5 minutes.
- **siGA secretion rate** (µg/min) was calculated by multiplying the absolute salivary siGA concentrations by the salivary flow rate.
- **STATISTICAL ANALYSIS**
- Between-group differences were assessed with the use of the Independent Samples t-Test (alpha 0.05).



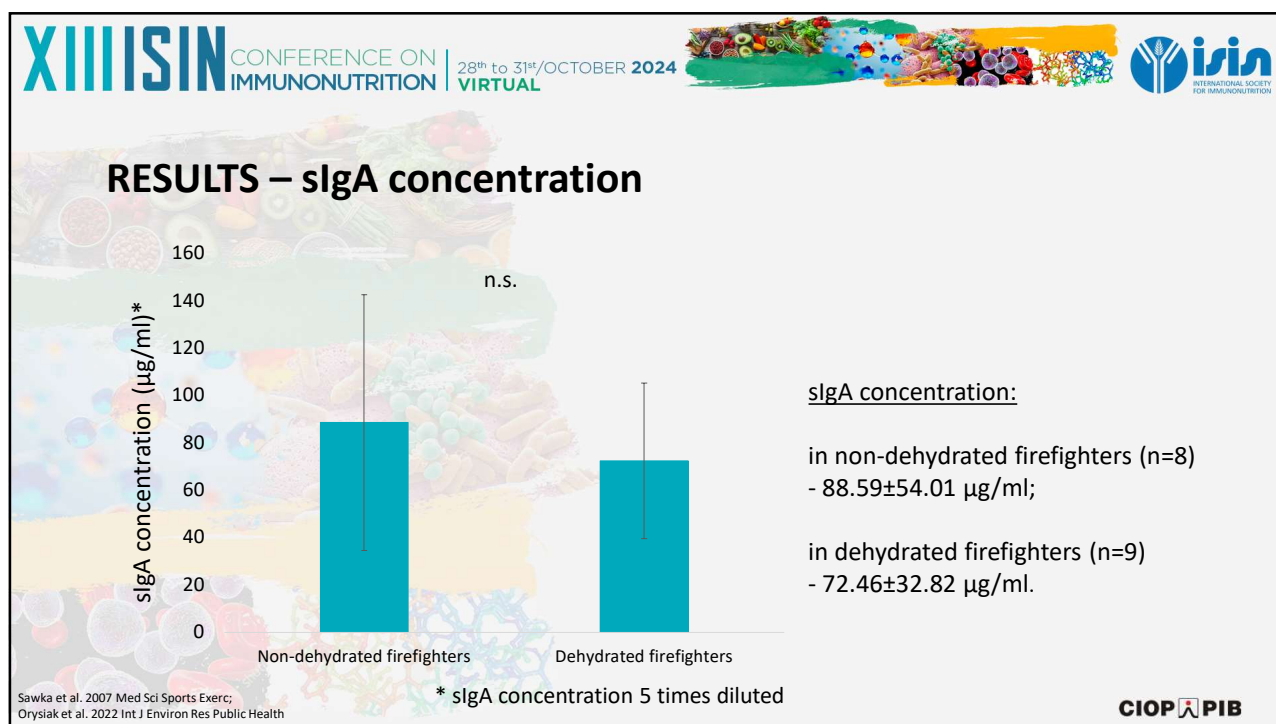
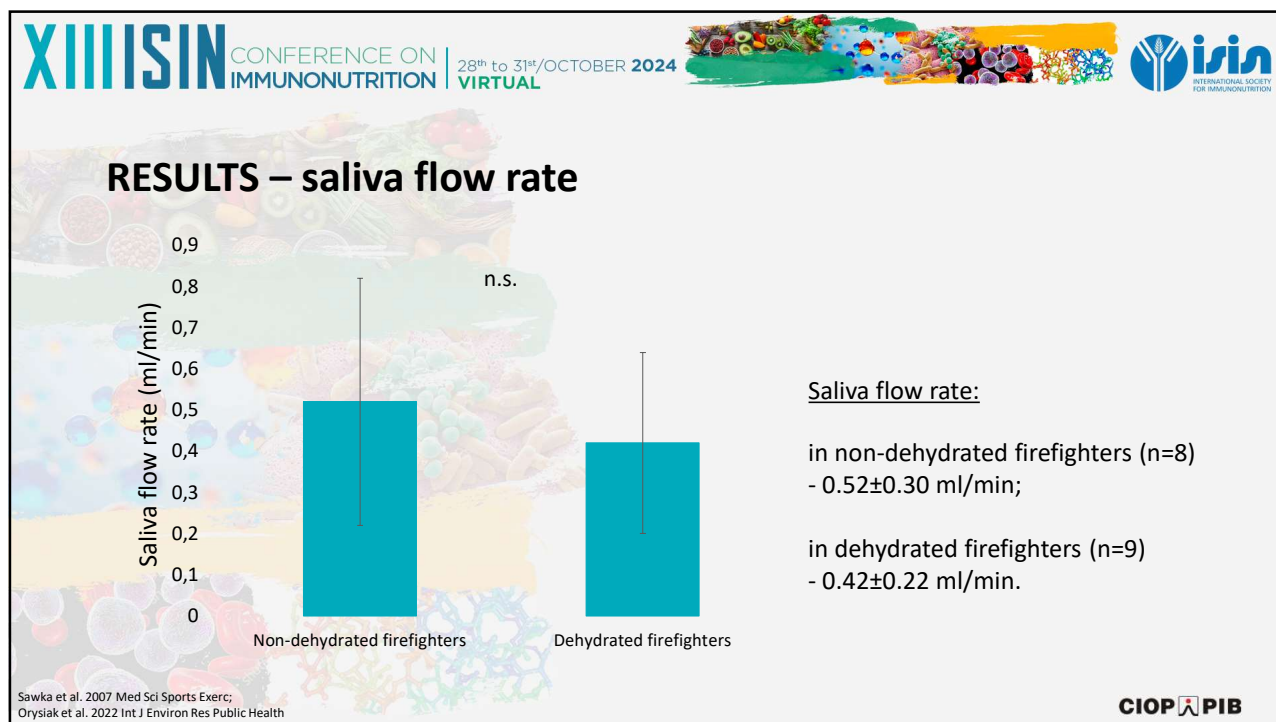
RESULTS – urine specific gravity (USG)

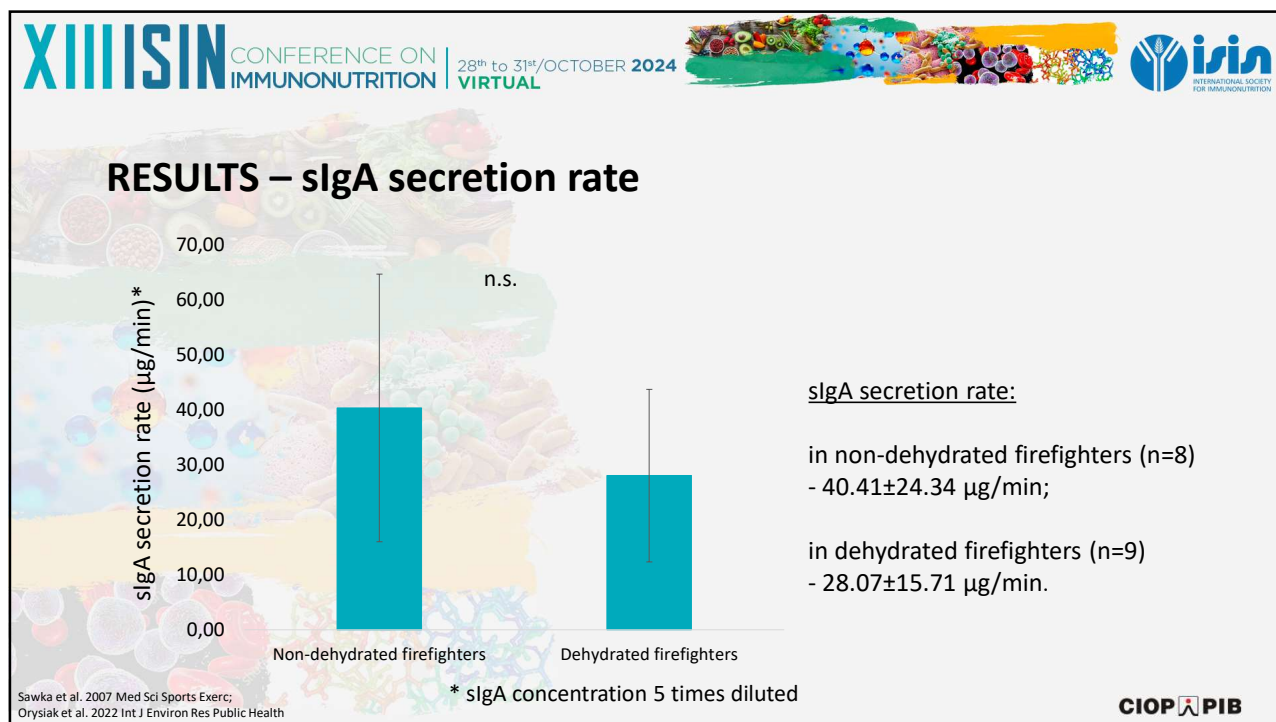


Mean USG:

in non-dehydrated firefighters (n=8)
- 1.014±0.003 g/ml;

in dehydrated firefighters (n=9)
- 1.025±0.004 g/ml.





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CONCLUSION

- Proper hydration can maintain the saliva flow rate, and therefore may have a positive effect on mucosal immunity due to an adequate presence of salivary antimicrobial proteins and prevent oral-respiratory surface drying and associated inflammatory responses.
- The hydration status did not significantly affect the secretory immunoglobulin A in our study.

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Gill et al. 2013 Appl Physiol Nutr Metab



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THANK YOU FOR YOUR ATTENTION!

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- This presentation was created on the basis of results of a research task carried out within the scope of the 6th stage of the National Programme “Governmental Programme for Improvement of Safety and Working Conditions”, funded by state services of the Ministry of Family, Labour and Social Policy (under the name of the Ministry of Family and Social Policy prior to December 12th, 2023).
- Task no. 3.ZS.12 entitled “Hydration status and immune system dysfunctions among officers of selected uniformed services”.
- The Central Institute for Labour Protection – National Research Institute is the Programme’s main co-ordinator.

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