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# EFFECTS OF N.A.P. THERAPY IN PATIENTS WITH VOICE DISORDERS

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# The aim of the study



To evaluate the effectiveness of N.A.P. therapy on voice improvement in patients with asthma and connected voice disorders treated in subterranean environment in Wieliczka Salt Mine Health Resort.





# Asthma influence on voice



- Dysphonia affects 39-83 % patients suffering from asthma  
*(Williamson et al. 1995, Lavy et al., 2000, Foster 2006)*
- Injuries of vocal folds are caused by hyperactivity of the larynx  
*(Benninger et al. 2011)*  
and by side effects of inhaled corticosteroids *(Ihre et al. 2004, Bhalla et al. 2008)*
- Reduction of lung capacity, shorter exhalation, disturbances of distribution and changes in the vocal folds cover are observed  
*(Grudzień-Ziarno 2013)*





# Neuroorthopedic Activity-dependent Plasticity N.A.P. therapy

An integrative neuro-orthopaedic therapy applied in neurological and orthopaedic rehabilitation as well as for prevention.

*(Horst 2009, 2011)*





# N.A.P. therapy



The aim of N.A.P. therapy is to enhance posture control and motor learning.

**Re-set the Brain**





# „Wieliczka” Salt Mine



The “Wieliczka” Salt Mine is one of the most valuable monuments of material and spiritual culture in Poland.

Each year it is visited by more than one million tourists from all over the world.





# The underground „Wieliczka” Salt Mine Health Resort (135m under the Earth)



## Subterranotherapy

An active rehabilitation with the use of the medicinal properties of the underground environment.



**The Dragon Chamber**



# The underground „Wieliczka” Salt Mine Health Resort (135m under the Earth)



## Healing properties

The air in the underground chambers owes its medicinal qualities mostly to a salt aerosol which works as a general and topical anti-inflammatory, is free of pollens and exerts bacteriostatic activity

*(Obtułowicz i in. 2013,  
Kostrzon, Badyda 2015)*







# The underground „Wieliczka” Salt Mine Health Resort (135m under the Earth)



## Healing properties

The partial pressure of oxygen is higher than on the surface, facilitating its absorption by tissues and organs of patients undergoing subterraneanotherapy.

*(Olechnowicz-Bobrowska, Wojkowski 2004)*



**The Lake Wessel Chamber**



# The underground „Wieliczka” Salt Mine Health Resort (135m under the Earth)



## Stability of climatic parameters

In the healing chambers the air temperature (13.0-14.5 °C) and humidity (60-75%) remain stable, regardless of the season of the year or conditions on the surface.

*(Kostrzon i in. 2005)*



**The Boczkowski Chamber**



# Rehabilitation stay in the underground health resort



## Study group

A pilot study (10-28.08.2015) with the participation of 17 patients (mean age  $53 \pm 15.8$  years) with bronchial asthma and chronic diseases of the upper respiratory tract.



**N.A.P. therapy underground**



# Methods



## Underground treatment

3 weeks of the rehabilitation stay combined with 12 group and 2 individual sessions of N.A.P. therapy which lasted 30 minutes each.



**Influence on sympatic, nervous system and chest mobility**



# Methods



## Chest mobility

Chest circumference difference between the maximum inhalation and exhalation.

*(Buckup, 2008)*



**Breathing pattern**



# Methods



## State of voice

MPT - duration of prolonged, uninterrupted phonation of the vowel [a] achieved during one exhalation.



**Maximum phonation time - MPT assessment**



# Methods



## Queen's College Step Test

*(Mc Ardle et al., 1972, Żołędź 2006)*

3-minute step test

40 cm high stool

22 steps per minute for women

24 steps per minute for men.



**VO<sub>2</sub> max**



# Application of N.A.P. therapy in the underground Wieliczka Salt Mine Health Resort



**Activity of thoraco-lumbar fascia  
Motor control**





# Application of N.A.P. therapy in the underground Wieliczka Salt Mine Health Resort



- Activity of sitting on a blaket in order to:**
- increase mobility of pelvis and rib joints
  - inhibit of supplementary breathing muscle



# Application of N.A.P. therapy in the underground Wieliczka Salt Mine

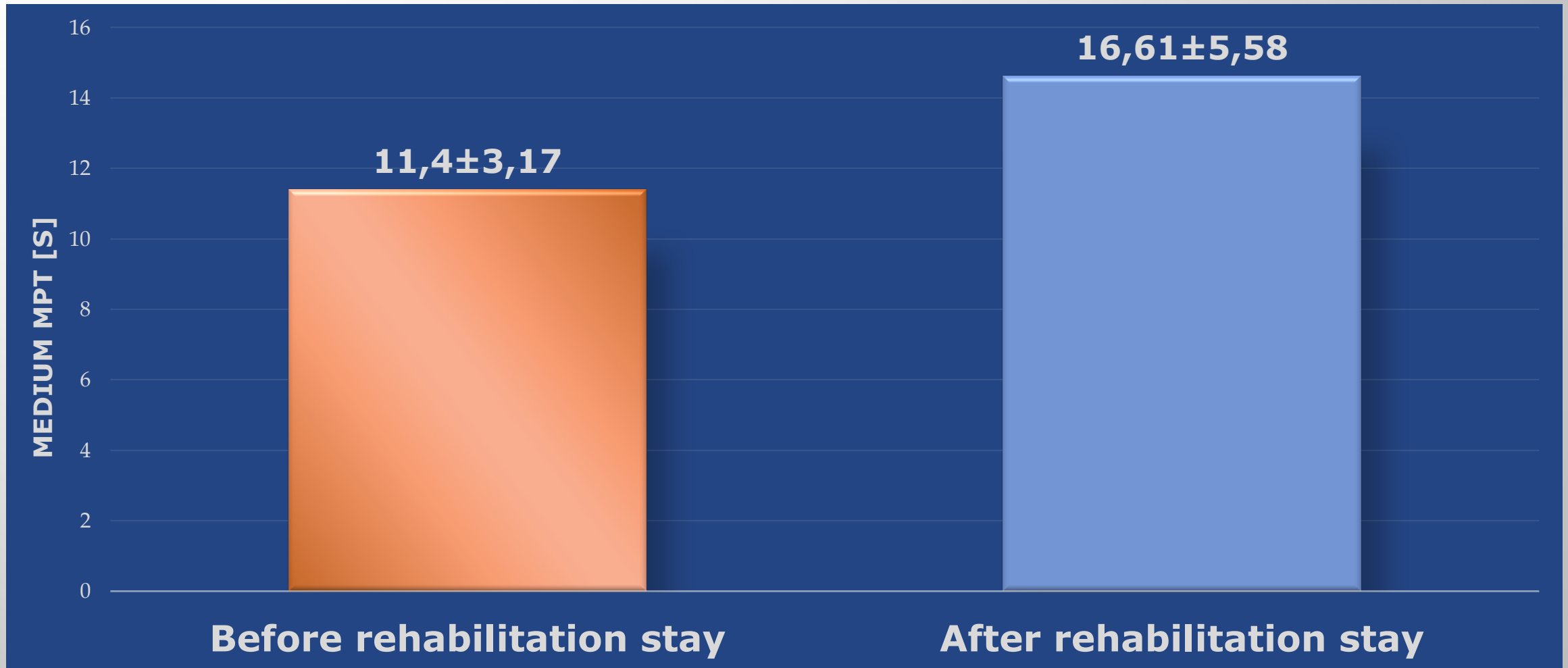


**Tongue activity with spatula:  
activity of deep muscle in front of cervical spine  
(pro-active stability of cervical spine)**



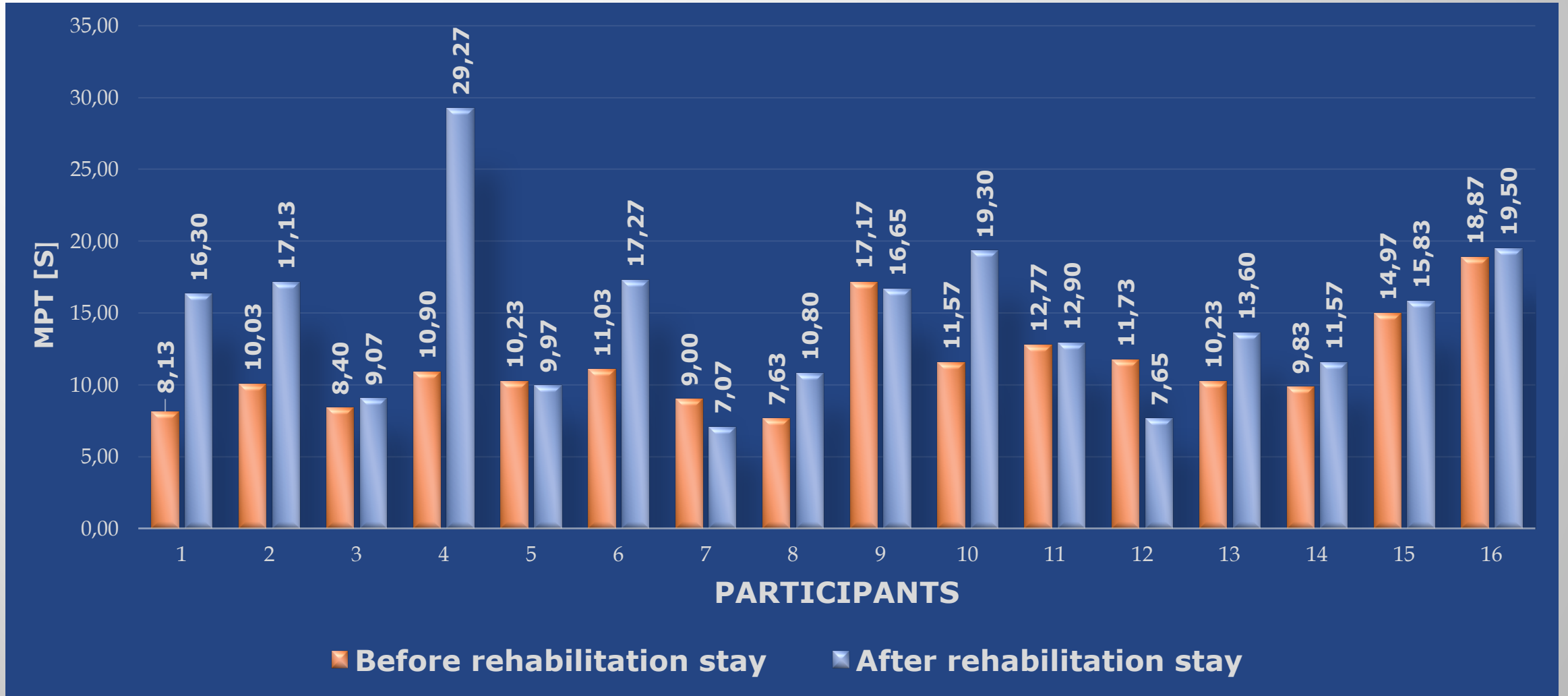
# Results:

## Maximum phonation time (MPT)



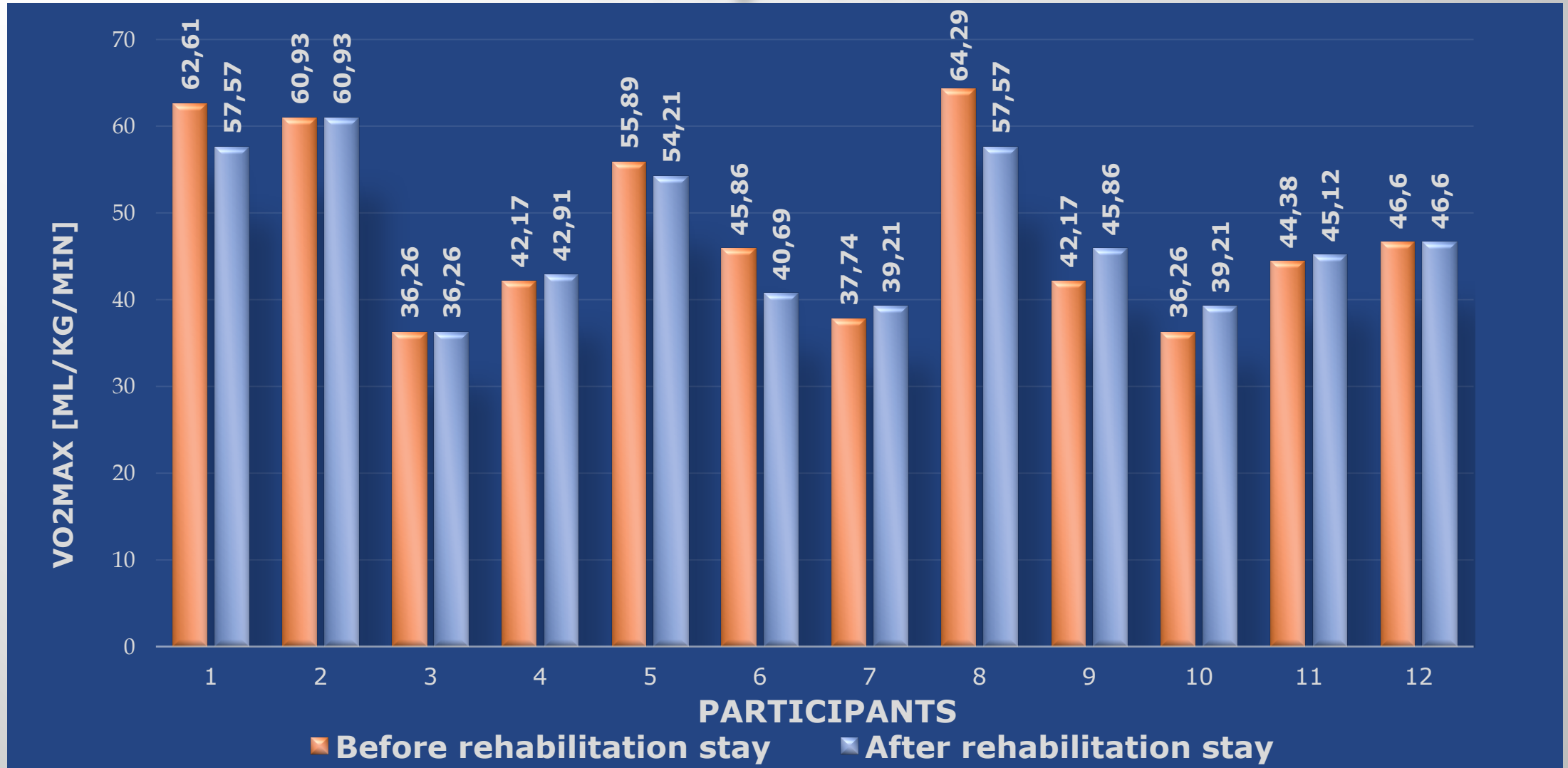


# Results: Maximum phonation time



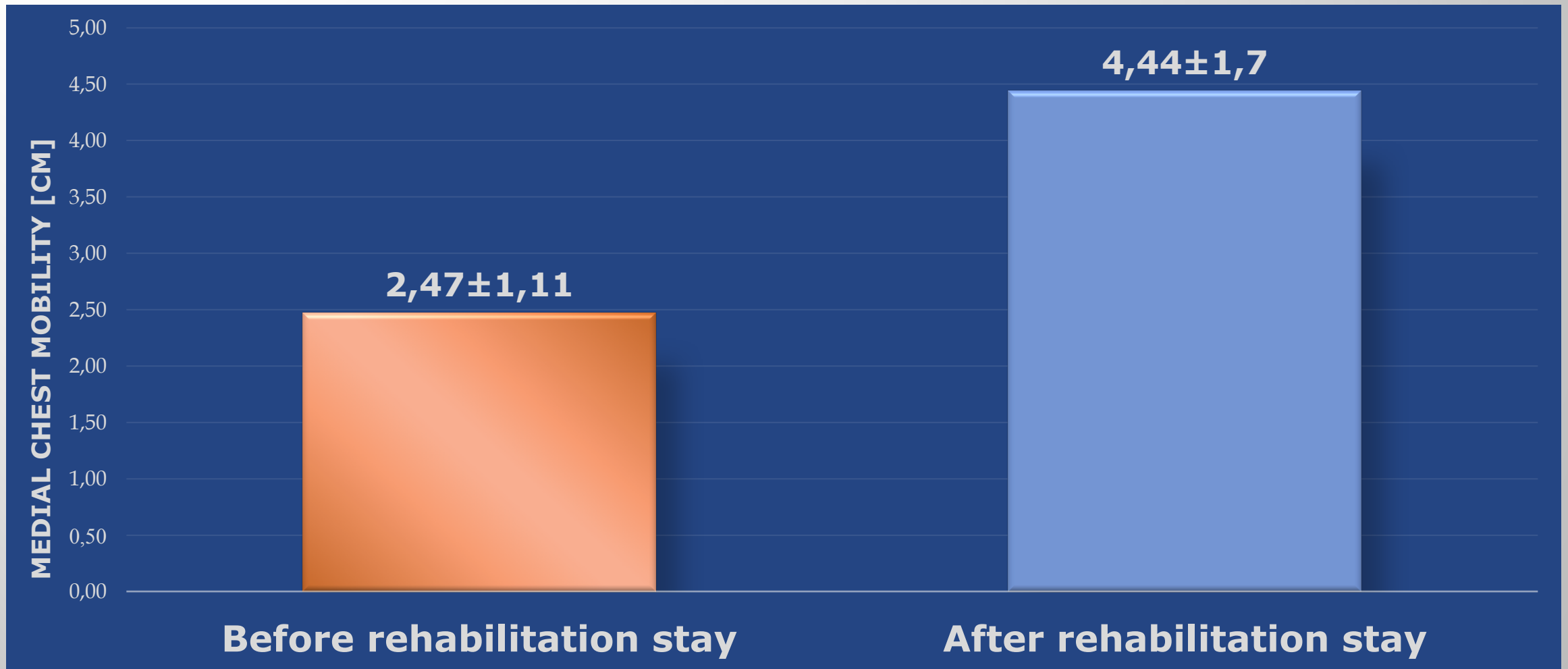


# Results: Step test





# Results: Chest mobility



# Conclusion

Comprehensive rehabilitation including:

- subterranean environment,
- breathing and postural therapy
- increasing the elasticity of supra- and infrahyoid muscles based on N.A.P. therapy techniques may significantly improve voice performance in patients with asthma.



# References

- Bhalla R.K., Jones A.S., Roland N.J. (2008), *Prevalence of pharyngeal and laryngeal complications in adult asthmatics using inhaled corticosteroids*. The Journal of Laryngology & Otology, 122(10), 1078-1083. doi:10.1017/S0022215107001272 (online access: 3.02.2018)
- Buckup K. (2008), *Testy kliniczne w badaniu kości, stawów i mięśni*, Wyd. Lek. PZWL. Warszawa, pp. 8-9
- Grudzień-Ziarno A. (2013), *Ocena głosu u pacjentów leczonych przy pomocy aerozoloterapii w chorobach układu oddechowego*, Uniwersytet Medyczny im. K. Marcinkowskiego in Poznan, doctoral thesis under supervision of prof. dr. hab. B. Wiskirska-Woźnica, <http://www.wbc.poznan.pl/Content/290283/index.pdf> (online access: 03.02.2018)
- Horst R. (2011), *N.A.P. – therapien in der Neuroortopadie*, Thieme, Stuttgart, pp.18-66.
- Ihre E., Zetterström O., Ihre E., Hammarberg B. (2004) *Voice problems as side effects of inhaled corticosteroids in asthma patients-a prevalence study*. J Voice. 18 (3), pp. 403-14.
- Kostrzon M., Czarnobilski K., Badyda A. (2015), *Climatecharacteristics of salt chambers used for therapeutic purposes in the 'Wieliczka' Salt Mine*. Acta Balneologic. LVII, 1 (139), pp. 52 – 58.
- Lavy J.A., Wood G., Rubin J.S., Harries M. (2000), *Dysphonia associated with inhaled steroids*. Journal of Voice, 14 (4), pp. 581–588
- Mc Ardle W.D., Katch F.I., Pechar G.S., Jacobson L., Ruck S. (1972), *Reliability and interrelationships between maximal oxygen intake, physical work capacity and step-test scores in college women*. Medicine & Science in Sports & Exercis. 4 (4), pp. 182-6.
- Obtulowicz K. (2013), *Mechanism of therapeutic effects of subterraneanotherapy in the chambers of the Salt Mine Wieliczka*, Alergologia i Immunologia, 10, pp. 26-29.
- Obtulowicz K., Myszkowska D., Dyga W., Mazur M., Czarnobilska E. (2013), *Hypoalergenowa subterraneanoterapia w komorach solnych Kopalni w Wieliczce w leczeniu alergii dróg oddechowych i skóry. Znaczenie bioaerozolu*. Alergologia i Immunologia, 10, pp. 20-23.
- Olechnowicz-Bobrowska B., Wojkowski J. (2004), *Bioklimat komór sanatoryjnych w Kopalniach Soli Bochni i Wieliczce*, Acta Agrophisica, 3 (2), pp. 343 – 349.
- Sivasankar M., Leydon C. (2010) *The role of hydration in vocal fold physiology*, Current Opinion in Otolaryngology & Head and Neck Surgery, 18 (3), pp. 171–175.