

# IJAE

## Italian Journal of Anatomy and Embryology

---

Official Organ of the Italian Society  
of Anatomy and Histology

**76° CONGRESSO  
della Società Italiana di Anatomia e Istologia**

Modena, 11-13 settembre 2023

**76<sup>TH</sup> MEETING  
of the Italian Society of Anatomy and Histology**

Modena, 11-13 September 2023

Vol. 127  
N. 1

**2023**  
Supplement

ISSN 1122-6714

  
FIRENZE  
UNIVERSITY  
PRESS

Founded by Giulio Chiarugi in 1901

**Editor-in-Chief**

Domenico Ribatti, University of Bari, Italy

**Managing Editor**

Ferdinando Paternostro, University of Firenze, Italy

**Editorial Board**

Gianfranco Alpini, Indiana University, USA  
Giuseppe Anastasi, University of Messina, Italy  
Juan Arechaga, University of Leioa, Spagna  
Erich Brenner, University of Innsbruck, Austria  
Marina Bentivoglio, University of Verona, Italy  
Anca M. Cimpean, University of Timisoara, Romania  
Lucio I. Cocco, University of Bologna, Italy  
Bruna Corradetti, Houston Methodist Hospital, USA  
Raffaele De Caro, University of Padova, Italy  
Valentin Djonov, University of Berne, Switzerland  
Amelio Dolfi, University of Pisa, Italy  
Roberto di Primio, University of Ancona, Italy  
Gustavo Egea, University of Barcellona, Spagna  
Antonio Filippini, University “La Sapienza”, Roma, Italy  
Eugenio Gaudio, University of Roma “La Sapienza”, Italy  
Paolo Mazzarello, University of Pavia, Italy  
Thimios Mitsiadis, University of Zurich, Switzerland  
John H. Martin, City University New York, USA  
Paolo Mignatti, New York University, USA  
Stefania Montagnani, University of Napoli, Italy  
Michele Papa, University of Napoli, Italia  
Jeroen Pasterkamp, University of Utrecht, The Netherlands  
Francesco Pezzella, University of Oxford, UK  
Marco Presta, University of Brescia, Italy  
Jose Sañudo, University of Madrid, Spain  
Gigliola Sica, University “Cattolica”, Roma, Italy  
Michail Sitkovsky, Harvard University, Boston, USA  
Carlo Tacchetti, University “Vita-Salute San Raffaele”, Milano, Italy  
Sandra Zecchi, University of Firenze, Italy

**Past-Editors**

I. Fazzari; E. Allara; G.C. Balboni; E. Brizzi; G. Gheri; P. Romagnoli

Journal e-mail: [ijae@unifi.it](mailto:ijae@unifi.it) – Web site: <http://www.fupress.com/ijae>

---

# Italian Journal of Anatomy and Embryology

## IJAE

**Vol. 127, n. 1 - 2023 Supplement**

76° CONGRESSO  
della Società Italiana di Anatomia e Istologia

Modena, 11-13 settembre 2023

76<sup>TH</sup> MEETING  
of the Italian Society of Anatomy and Histology

Modena, 11-13 September 2023

Firenze University Press

**Italian Journal of Anatomy and Embryology**

*Published by*

**Firenze University Press** – University of Florence, Italy

Via Cittadella, 7 - 50144 Florence - Italy

<http://www.fupress.com/substantia>

Direttore responsabile: **Ferdinando Paternostro, University of Firenze, Italy**

Direttore scientifico: **Domenico Ribatti, University of Bari, Italy**

**Copyright** © 2023 Supplement **Authors**. The authors retain all rights to the original work without any restriction.

**Open Access.** This issue is distributed under the terms of the [Creative Commons Attribution 4.0 International License \(CC-BY-4.0\)](https://creativecommons.org/licenses/by/4.0/) which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The Creative Commons Public Domain Dedication (CC0 1.0) waiver applies to the data made available in this issue, unless otherwise stated.

**COMMEMORAZIONE DELLA NASCITA  
DI GABRIELE FALLOPIO (MODENA, 1523)**

## Relationship between BMI, physical activity and daytime activity levels during a week of a spa stay

LUCIA CASTELLI<sup>1</sup>, LETIZIA GALASSO<sup>1</sup>, ANTONINO MULÈ<sup>1</sup>, ANDREA CIORCIARI<sup>1</sup>, FRANCESCA FORNASINI<sup>2</sup>, ROVEDA ELIANA<sup>1,3</sup>, ESPOSITO FABIO<sup>1,3</sup>, MONTARULI ANGELA<sup>1,3</sup>

<sup>1</sup> Department of Biomedical Sciences for Health, University of Milan, Via Giuseppe Colombo 71, 20133 Milan, Italy

<sup>2</sup> GB Hotels Abano, via Valerio Flacco, 99 Abano Terme, Italy

<sup>3</sup> I.R.C.C.S. Ospedale Galeazzi-Sant'Ambrogio, Via Cristina Belgioioso 173, 20161 Milan, Italy

Obesity has become a worldwide issue that can exacerbate some ageing-related comorbidities. Physical activity (PA) can counteract weight gain and obesity [1]. The thermal environment, including facilities and treatments, have been described as increasing PA [2], [3]. The current study aims to assess the PA levels in relation to different BMI categories during a week of spa stay.

137 participants (males=35.8%; 64.3±10.5yrs) staying one week at GB-Hotels (Abano Terme, Italy) and undergoing spa treatments filled in the *Godin-Shepard Leisure-Time Physical Activity Questionnaire* (GSL-TPAQ; LSI – as measure unit) both at the beginning and the end of the spa stay in order to evaluate the PA of the previous week and during the spa stay. Actigraph Motion Watch 8 (CamNtech) monitored daytime activity all week long. One-way ANOVA analyses among BMI categories were adjusted for age and sex. FORST funded the current study.

BMI values classified participants as normal weight (NW: 50.4%), overweight (OW: 35%), and obese (OB: 14.6%). NW participants collected the highest GSL-TPAQ score either the week before (NW=31.1±21.9 LSI; OW=25.7±23.4 LSI; OB=20.5±17.5 LSI), even though without statistical significance ( $p=0.08$ ), or during the week of the spa stay (NW=44.3±33.1 LSI; OW=36.6±24.4 LSI; OB=27.6±15.9 LSI;  $p=0.04$ ), with only a tendency to statistical significance between NW and OB in the *Bonferroni post-hoc test* ( $p=0.06$ ). GSL-TPAQ delta values were higher in NW than in the other two BMI categories, although they did not reach statistical significance (NW=13.1±7.3 LSI; OW=11±6.6 LSI; OB=7.1±4.7 LSI;  $p=0.8$ ). Thus, NW seemed to increment the PA more during the spa stay. The actigraphic data analysis showed a higher percentage of daytime activity in NW compared to the other two BMI classifications

(NW=43±7.6%; OW=40.6±9%; OB=38.5±8.4%) even though without statistical significance ( $p=0.8$ ).

With a view to promoting an active lifestyle and increasing PA, it seems that a week of spa stay can be effective. The data showed that NW subjects seemed to have more significant benefits from the spa stay to improve PA and, in general, their active lifestyle, compared to the other two BMI categories. The leisure-time PA could be favoured by the facilities offered by the resorts, free time, and a greater predisposition to being active during the spa stay.

### References

- [1] “Obesity: preventing and managing the global epidemic. Report of a WHO consultation.” *World Health Organ Tech Rep Ser*, vol. 894, 2000.
- [2] J. Maitre, B. Guinhouya, N. Darrietort, and T. Pailard, “Physical Education in a Thermal Spa Resort to Maintain an Active Lifestyle at Home: A One-Year Self-Controlled Follow-Up Pilot Study,” *Evidence-based Complementary and Alternative Medicine*, vol. 2017, 2017, doi: 10.1155/2017/1058419.
- [3] L. Castelli *et al.*, “Sleep and spa therapies: What is the role of balneotherapy associated with exercise? A systematic review,” *Front Physiol*, vol. 13, p. 1560, Aug. 2022, doi: 10.3389/FPHYS.2022.964232/BIBTEX.

**Keywords:** Body mass index; body mass; active lifestyle; physical activity; thermal treatments; balneotherapy