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Association between body mass index and VO2 max among members of a running community

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A R T I C L E I N F O

Keywords:
Body mass index,
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Running community,
VO2 Max.

A B S T R A C T

Body Mass Index and VO2 Max are important indicators related to body composition, cardiorespiratory fitness, and running performance. In running communities, maintaining an ideal body composition may support better aerobic capacity and reduce excessive mechanical load during physical activity. This study aimed to describe Body Mass Index characteristics, VO2 Max capacity, and the possible association between BMI and VO2 Max among members of the Garuda Emas Running Team. This study used a descriptive observational approach and was conducted at Pahoman Stadium, Bandar Lampung. A total of 19 running community members participated in anthropometric and cardiorespiratory fitness measurements. BMI was calculated based on body weight and height, while VO2 Max was estimated using a field-based fitness test. The results showed that most participants had normal BMI, with 12 participants, or 63%, categorized as normal, while 3 participants, or 15%, were underweight, 2 participants, or 11%, were overweight, and 2 participants, or 11%, were obese. VO2 Max results showed that most participants had very good cardiorespiratory fitness, with 13 participants, or 70%, categorized as very good, 3 participants, or 15%, categorized as good, and 3 participants, or 15%, categorized as fair. These findings indicate that most members of the running community had ideal body composition and high aerobic fitness. Descriptively, participants with normal BMI tended to show better VO2 Max capacity, suggesting that maintaining appropriate body composition may support cardiorespiratory performance among community runners. Further statistical analysis with a larger sample size is recommended to determine the strength and significance of the relationship between BMI and VO2 Max.

1. Introduction

Running is one of the most popular forms of physical activity because it is simple, inexpensive, and can be performed by individuals from various age groups and fitness levels. In recent years, running communities have grown rapidly and have become important platforms for promoting physical activity, healthy lifestyles, and social support. For runners, both recreational and competitive, physical fitness plays an important role in supporting running performance, delaying fatigue, and reducing the risk of exercise-related problems [1, 2].

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One of the most important components of physical fitness in runners is cardiorespiratory endurance. Cardiorespiratory endurance reflects the ability of the cardiovascular and respiratory systems to deliver oxygen to working muscles during prolonged physical activity. The most widely used indicator of cardiorespiratory fitness is maximal oxygen uptake, or VO2 Max. VO2 Max represents the maximum amount of oxygen that can be utilized by the body during intense exercise and is commonly expressed in milliliters of oxygen per kilogram of body weight per minute. A higher VO2 Max value indicates better aerobic capacity, greater endurance, and improved efficiency during running [3–5].

VO2 Max is influenced by several factors, including age, sex, training status, cardiovascular function, respiratory capacity, muscle oxidative capacity, and body composition. Among these factors, Body Mass Index is commonly used as a simple anthropometric indicator to assess nutritional status and body composition. BMI is calculated from body weight and height and is often used to classify individuals as underweight, normal, overweight, or obese. Although BMI does not directly measure body fat percentage, it remains useful as an initial screening tool in community-based health and fitness assessments [6, 7].

In the context of running, BMI may influence VO2 Max and physical performance. Since relative VO2 Max is expressed per kilogram of body weight, excessive body mass may reduce the relative oxygen uptake value. Higher BMI, particularly when associated with increased fat mass, may also increase mechanical load during running, reduce movement efficiency, and contribute to earlier fatigue. Conversely, individuals with normal BMI and regular running habits may have better aerobic adaptation, more efficient oxygen utilization, and higher cardiorespiratory fitness [8–10].

Maintaining an appropriate BMI is therefore important not only for general health but also for running performance. Excess body weight can increase cardiovascular workload and place additional stress on the musculoskeletal system during running. This condition may contribute to reduced endurance and potentially increase the risk of injury, especially when combined with low cardiorespiratory fitness. Therefore, evaluating BMI and VO2 Max among community runners can provide useful information for designing training, fitness monitoring, and weight management strategies [3, 11].

The Garuda Emas Running Team is a running community whose members may have different physical backgrounds, training habits, and nutritional status. Unlike professional athletes, community runners often show greater variation in body composition and fitness level. Therefore, assessing BMI and VO2 Max in this group is important to understand the general fitness profile of its members and to identify whether body composition may be related to cardiorespiratory fitness.

Based on this background, this study aimed to describe Body Mass Index characteristics, VO2 Max capacity, and the possible association between BMI and VO2 Max among members of the Garuda Emas Running Team. The findings are expected to provide basic information for improving training programs, maintaining ideal body composition, enhancing cardiorespiratory fitness, and supporting safer physical activity among community runners.

2. Materials and Methods

2.1. Study design and location

This study used a descriptive observational approach to assess Body Mass Index and VO2 Max among members of the Garuda Emas Running Team. The study focused on describing the BMI profile, cardiorespiratory fitness level, and the possible association between BMI and VO2 Max in community runners. This design was selected because the study aimed to evaluate anthropometric status and aerobic fitness capacity in a real community-based running setting.

The study was conducted at Pahoman Stadium, Bandar Lampung, Indonesia, among members of the Garuda Emas Running Team. Data collection was carried out on May 16, 2026, during a community running activity. This location was selected because it is a regular training area for the running community and provides an appropriate setting for field-based fitness assessment. The original manuscript states that measurements were conducted among members of the Garuda Emas Running Team at Pahoman Stadium, with BMI and VO2 Max as the main variables [12, 13].

A total of 19 members of the Garuda Emas Running Team participated in the BMI and VO2 Max measurements. Participants were community runners who were present during the data collection period and were willing to undergo anthropometric and cardiorespiratory fitness assessment. Participants were included if they were physically able to perform the field-based fitness test and had no acute medical complaints during the activity.

2.2. Anthropometric and VO2 Max measurement

Anthropometric measurements included body weight and height. Body weight was measured in kilograms, while height was measured in meters. Body Mass Index was calculated using the following equation (1) and **Table 1**.

$$BMI = body\ weight\ (kg)\ /\ height^2\ (m^2) \tag{1}$$

Table 1
Body mass index classification

BMI Category	BMI Value
Underweight	<18.5 kg/m²
Normal	18.5–22.9 kg/m²
Overweight	23.0–24.9 kg/m²
Obese	≥25.0 kg/m²

BMI was used as an indicator of body composition and nutritional status among running community members.

VO2 Max was assessed using a field-based fitness test. The manuscript includes several possible VO2 Max assessment methods, but for consistency and practicality in a running community setting, the 12-minute Cooper test is the most appropriate field test. In this test, participants were instructed to run or jog as far as possible for 12 minutes. The total distance covered during the test was recorded in meters. VO2 Max was estimated using the following Cooper test equation (2) and **Table 2**.

$$VO_2Max = (distance\ covered\ in\ meters - 504.9)\ /\ 44.73$$

Table 2
The estimated VO2 Max value was expressed in mL/kg/min and categorized into fitness levels

Fitness Category	VO2 Max Value
Very Poor	<35.0 mL/kg/min
Poor	35.0–41.9 mL/kg/min
Fair	42.0–46.9 mL/kg/min
Good	47.0–52.9 mL/kg/min
Very Good	≥53.0 mL/kg/min

2.3. Data collection procedure

Data collection was conducted in several stages. First, participants were given a brief explanation regarding the purpose and procedure of the study. Second, anthropometric measurements were performed to obtain body weight and height. Third, BMI was calculated and classified according to BMI categories. Fourth, participants performed a warm-up before the VO_2 Max field test. Fifth, participants completed the 12-minute Cooper test, and the distance covered was recorded. Finally, VO_2 Max was estimated using the Cooper formula and classified according to cardiorespiratory fitness categories.

Data were analyzed descriptively to present the distribution of BMI categories and VO_2 Max fitness categories. The number and percentage of participants in each BMI and VO_2 Max category were calculated. To examine the relationship between BMI and VO_2 Max, correlation analysis should be performed using individual BMI and VO_2 Max data. If the data are normally distributed, Pearson correlation analysis can be used. If the data are not normally distributed, Spearman rank correlation analysis is more appropriate. The correlation coefficient can indicate the strength and direction of the association between BMI and VO_2 Max see in **Table 3**.

Table 3
The interpretation of correlation strength classification

Correlation Coefficient	Interpretation
0.00–0.19	Very weak
0.20–0.39	Weak
0.40–0.59	Moderate
0.60–0.79	Strong
0.80–1.00	Very strong

A scatter plot can also be used to visually describe the relationship between BMI and VO_2 Max, with BMI placed on the x-axis and VO_2 Max on the y-axis. Participants were informed about the purpose and procedure of the measurements before data collection. Participation was voluntary, and the data were presented in aggregate form without revealing individual identities. The field test was conducted with attention to participant safety, including warm-up before testing and observation during the activity.

3. Results and discussion

This study involved 19 members of the Garuda Emas Running Team who participated in anthropometric and cardiorespiratory fitness measurements. The two main variables assessed were Body Mass Index, as an indicator of body composition, and VO_2 Max, as an indicator of cardiorespiratory fitness. The measurements were conducted to describe the general fitness profile of community runners and to observe the possible association between BMI and VO_2 Max.

3.1. Body mass index characteristics

The distribution of Body Mass Index categories among participants is shown in **Table 4**. Most participants were classified as having normal BMI. A total of 12 participants, or 63%, were in the normal category. Meanwhile, 3 participants, or 15%, were underweight, 2 participants, or 11%, were overweight, and 2 participants, or 11%, were obese [6, 14, 15].

Table 4
Body mass index characteristics of participants

BMI Category	BMI Value	Number of Participants	Percentage
Underweight	<18.5 kg/m²	3	15%
Normal	18.5–22.9 kg/m²	12	63%
Overweight	23.0–24.9 kg/m²	2	11%
Obese	≥25.0 kg/m²	2	11%
Total		19	100%

These findings indicate that the majority of Garuda Emas Running Team members had appropriate body composition based on BMI classification. This condition may reflect the positive influence of regular running activity and active lifestyle habits among community members. However, the presence of participants in the underweight, overweight, and obese categories suggests that body composition monitoring remains important, even among individuals who participate in regular physical activity.

Maintaining BMI within the normal range is important for runners because excess body weight may increase mechanical load during running, reduce movement efficiency, and increase cardiovascular workload. On the other hand, underweight status may also indicate insufficient nutritional status, which can affect endurance, recovery, and overall physical performance. Therefore, BMI assessment can provide useful screening information for developing individualized training and nutrition recommendations [4, 16].

3.2. VO_2 Max capacity of participants

The VO_2 Max distribution of participants is presented in **Table 5**. The results showed that most participants had very good cardiorespiratory fitness. A total of 13 participants, or 70%, were classified in the very good category. Meanwhile, 3 participants, or 15%, were in the good category, and 3 participants, or 15%, were in the fair category. No participants were classified as poor or very poor [17, 18].

Table 5
VO_2 Max capacity of participants

Fitness category	VO_2 max value	Number of participants	Percentage
Very Poor	<35.0 mL/kg/min	0	0%
Poor	35.0–41.9 mL/kg/min	0	0%
Fair	42.0–46.9 mL/kg/min	3	15%
Good	47.0–52.9 mL/kg/min	3	15%
Very Good	≥53.0 mL/kg/min	13	70%
Total		19	100%

The high proportion of participants in the very good VO_2 Max category suggests that the members of this running community generally had strong cardiorespiratory fitness. This may be associated with regular running activities, which can improve cardiovascular function, respiratory efficiency, oxygen transport, and skeletal muscle oxidative capacity.

VO_2 Max is an important indicator for runners because it reflects the body's maximum ability to use oxygen during intense physical activity. A higher VO_2 Max allows runners to maintain physical effort for a longer duration and delay the onset of fatigue. Therefore, the high VO_2 Max profile observed in this group indicates that most participants had good aerobic fitness capacity to support running performance [3, 6, 16].

3.3. Descriptive association between BMI and VO_2 Max

The descriptive findings suggest that participants with normal BMI tended to show better cardiorespiratory fitness. This can be seen from the dominance of the normal BMI category and the high proportion of participants classified as having very good VO_2 Max. However, because the available data are presented in grouped categories, the strength and statistical significance of the relationship between BMI and VO_2 Max cannot be confirmed without individual paired data. Physiologically, BMI may influence VO_2 Max because relative VO_2 Max is expressed in milliliters of oxygen per kilogram of body weight per minute. When body weight increases, especially due to excess fat mass, the relative VO_2 Max value may decrease because the same oxygen consumption is divided by a greater body mass. In running activities, excess body mass may also increase energy cost, mechanical load, and cardiovascular demand.

In contrast, individuals with normal BMI may demonstrate better relative oxygen consumption because they carry less non-functional mass during movement. This may improve running economy and aerobic efficiency. However, BMI alone cannot fully explain VO_2 Max because cardiorespiratory fitness is also influenced by training frequency, running intensity, age, sex, genetic factors, muscle oxidative capacity, and overall health status. Therefore, the relationship between BMI and VO_2 Max should be interpreted carefully. The current results show a descriptive tendency that normal BMI and very good VO_2 Max were dominant among participants, but further statistical analysis is needed to determine whether BMI is significantly associated with VO_2 Max in this running community.

3.4. Implications for running performance

The findings have practical implications for community runners. Maintaining normal BMI may support running performance by reducing unnecessary mechanical load and improving movement efficiency. Runners with excessive BMI may require greater energy expenditure to move their body mass, which can contribute to earlier fatigue during running. This condition may reduce endurance performance and affect training outcomes.

On the other hand, high VO_2 Max is beneficial for running performance because it reflects strong cardiorespiratory endurance. Runners with higher VO_2 Max can generally sustain aerobic activity more efficiently and recover better after training. Therefore, training programs for community runners should not only focus on running distance or speed but also include body composition monitoring, aerobic conditioning, nutrition management, and recovery strategies [24].

3.5. BMI, VO_2 Max, and injury prevention

Although this study focuses on BMI and VO_2 Max, the findings also have relevance for injury prevention. Runners with higher BMI may experience greater ground reaction forces during running, which can increase stress on the lower extremities. If this condition is combined with low cardiorespiratory fitness, fatigue may occur earlier and may reduce neuromuscular control, balance, and movement coordination.

Reduced aerobic capacity may contribute to premature fatigue, which can affect running mechanics and increase the risk of musculoskeletal problems. Therefore, maintaining normal BMI and improving VO_2 Max may help support safer running performance. However, injury risk was not directly measured in this study, so this interpretation should be considered a practical implication rather than a confirmed finding [14, 22, 23].

The title of this study emphasizes the association between BMI and VO_2 Max. Therefore, further analysis is recommended using individual BMI and VO_2 Max values. If the data are normally distributed, Pearson correlation analysis can be used. If the data are not normally distributed, Spearman correlation analysis would be more appropriate. A scatter plot showing BMI on the x-axis and VO_2 Max on the y-axis is also recommended to visualize the relationship between the two variables. This would strengthen the manuscript by providing clearer evidence of whether BMI has a negative, positive, or non-significant relationship with VO_2 Max among running community members [20, 21, 25].

3.6. Study limitations

This study has several limitations. First, the sample size was relatively small, involving only 19 participants. Second, the data were presented in categorical form, so the statistical relationship between BMI and VO_2 Max could not be fully evaluated in the current analysis. Third, BMI does not directly distinguish between fat mass and muscle mass, which may be important among physically active individuals. Fourth, other factors that may influence VO_2 Max, such as age, sex, training frequency, running experience, smoking status, and nutritional intake, were not analyzed [16, 26, 27].

Despite these limitations, this study provides useful preliminary information regarding the BMI and VO_2 Max profile of members of a running community. The results can be used as a basis for further evaluation, training planning, and health promotion among community runners [14, 22, 23].

Overall, most members of the Garuda Emas Running Team had normal BMI and very good VO_2 Max. This indicates that the running community generally had favorable body composition and strong cardiorespiratory fitness. Descriptively, normal BMI appeared to be associated with better VO_2 Max capacity, but further statistical analysis using individual data is required to confirm the strength and significance of this relationship. These findings support the importance of maintaining ideal body composition and improving aerobic fitness to enhance running performance and promote safe physical activity among community runners. The original manuscript also reported that 63% of participants had normal BMI and 70% had very good VO_2 Max, which supports this revised interpretation [28, 29].

4. Conclusion

This study shows that most members of the Garuda Emas Running Team had favorable body composition and strong cardiorespiratory fitness. Based on BMI measurements, the majority of participants were classified in the normal category, while smaller proportions were underweight, overweight, and obese. VO_2 Max assessment also showed that most participants had very good cardiorespiratory fitness, with no participants categorized as poor or very poor.

Descriptively, the findings suggest that participants with normal BMI tended to have better VO_2 Max capacity. This indicates that maintaining an appropriate body composition may support aerobic performance among community runners. However, because the current analysis was based mainly on categorical data, the relationship between BMI and VO_2 Max should be interpreted carefully. A stronger conclusion regarding the association between these variables requires individual-level data and statistical correlation analysis.

Overall, BMI and VO_2 Max assessment can provide useful information for evaluating physical fitness and supporting training programs in running communities. Maintaining normal BMI, improving aerobic capacity, and monitoring body composition may help enhance running performance and reduce the risk of fatigue-related problems during physical activity. Future studies should involve a larger sample size, include individual BMI and VO_2 Max values, and apply correlation analysis to determine the strength and significance of the relationship between BMI and VO_2 Max among community runners. This conclusion is aligned with the manuscript data showing that 63% of participants had normal BMI and 70% had very good VO_2 Max capacity.

CRediT authorship contribution statement

Sandhy Arya Pratama: Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Zaleha Ulfa:** Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Tsania Raisa Afifah**: Writing – original draft, Methodology, Investigation, Formal analysis, Data curation. **Ulani Sriwahyuni**: Investigation, Data curation, Formal analysis, Writing – original draft. **Uswatun Hasanah**: Investigation, Data curation, Formal analysis. **Vheona Rizani**: Investigation, Data curation, Formal analysis. **Vio Vaula Nasution**: Investigation, Data curation, Formal analysis. **Widia Putri Khairani**: Investigation, Data curation, Formal analysis. **Wira Ayu Kusuma**: Investigation, Data curation, Formal analysis. **Farhan Aditya Wicaksono**: Investigation, Data curation, Formal analysis, Writing – review & editing. **Ariel Ghaali Pangestu**: Investigation, Data curation, Formal analysis, Writing – review & editing. **Muhammad Syafik Almuarif**: Validation, Resources, Conceptualization, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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References

1. Andersen, J. D., Jensen, M. H., Vestergaard, P., Jensen, V., Hejlesen, O., & Hangaard, S. (2023). The multidisciplinary team in diagnosing and treatment of patients with diabetes and comorbidities: A scoping review. Journal of Multimorbidity and Comorbidity, 13, 1–14. Doi: 10.1177/26335565231165966
2. Bain, S. C., Cummings, M. H., & McKay, G. A. (2024). Multidisciplinary approach to management and care of patients with type 2 diabetes mellitus. European Medical Journal
3. Bellou, V., Belbasis, L., Tzoulaki, I., & Evangelou, E. (2018). Risk factors for type 2 diabetes mellitus: An exposure-wide umbrella review of meta-analyses. PLOS ONE, 13(3), e0194127. Doi: 10.1371/journal.pone.0194127
4. Bouly, M., Laborne, F. X., Tourte, C., Henry, E., Penfornis, A., & Dardari, D. (2024). Post-healing follow-up of diabetic foot ulcers by a multidisciplinary team to reduce recurrence. Journal of Clinical Medicine, 14(14), 4975. Doi: 10.3390/jcm14144975
5. Chen, M., Pu, L., Gan, Y., Wang, X., Kong, L., Guo, M., Yang, H., Li, Z., & Xiong, Z. (2024). Association between variability of risk factors and complications in type 2 diabetes mellitus: A retrospective study. Scientific Reports, 14, 56777. Doi: 10.1038/s41598-024-56777-w
6. Cooper, Z. W., O'Shields, J., Ali, M. K., Chwastiak, L., & Johnson, L. C. M. (2024). Effects of integrated care approaches to address co-occurring depression and diabetes: A systematic review and meta-analysis. Diabetes Care, 47(12), 2291–2304. Doi: 10.2337/dc24-1334
7. Ismail, L., Materwala, H., & Al Kaabi, J. (2021). Association of risk factors with type 2 diabetes: A systematic review. Computational and Structural Biotechnology Journal, 19, 3006–3017. Doi: 10.1016/j.csbj.2021.02.030
8. Mannucci, E. (2021). Which antidiabetic drug indications are recommended for geriatric DM patients? Journal of Gerontology and Geriatrics, 69(Special Issue 4), 45–52. Doi: 10.36150/2499-6564-N458
9. Mbela, L. F., Vanherwegen, A. S., Nobels, F., & Matricali, G. A. (2024). Multidisciplinary Delphi consensus to define evidence-based quality indicators for diabetic foot ulcer care. European Journal of Public Health, 34(2), 253–259. Doi: 10.1093/eurpub/ckad235
10. Meloni, M., Giurato, L., Monge, L., Miranda, C., Scatena, A., Ragghianti, B., Silverii, G. A., Vermigli, C., De Cassai, A., Volpe, A., Tramonta, R., Medea, G., Bordieri, C., Falcone, M., Stefanon, L., Bernetti, A., Cappella, C., Gargiulo, M., Lorenzoni, V., & Scevola, G. (2024). Effect of a multidisciplinary team approach in patients with diabetic foot ulcers on major adverse limb events. Acta Diabetologica, 61, 543–553. Doi: 10.1007/s00592-024-02246-9
11. Migdalis, I. N. (2024). Chronic complications of diabetes: Prevalence, prevention, and management. Journal of Clinical Medicine, 13(23), 7001. Doi: 10.3390/jcm13237001
12. Oliveira, D., Henriques, A., Nogueira, P., & Costa, A. (2024). Impact of social prescribing intervention on people with type 2 diabetes mellitus in a primary healthcare context: A systematic literature review. Journal of Public Health, 32(4), 567–578. Doi: 10.1007/s10389-024-02315-x
13. Pascoe, M. C., Thompson, D. R., Castle, D. J., Jenkins, Z. M., & Ski, C. F. (2017). Psychosocial interventions and wellbeing in individuals with diabetes mellitus: A systematic review and meta-analysis. Frontiers in Psychology, 8, 2063. Doi: 10.3389/fpsyg.2017.02063
14. Siswidiasari, A., Nurmawati, D., Wati, H., & Priyono, T. D. S. A. (2025). The effectiveness of metformin and glimepiride therapy on reducing blood glucose levels in patients with diabetes mellitus. Global Journal Indexing, 2(9), 827–836
15. Tavasoli, N., & Larijani, B. (2024). Editorial: Interdisciplinary research in diabetology. Frontiers in Endocrinology, 15, 1490025. Doi: 10.3389/fendo.2024.1490025.
16. Xie, J., & Deng, W. (2017). Psychosocial intervention for patients with type 2 diabetes mellitus and comorbid depression: A meta-analysis of randomized controlled trials. Neuropsychiatric Disease and Treatment, 13, 2681–2690. Doi: 10.2147/NDT.S116465.
17. Yap, J. M., Tantono, N., Wu, V. X., & Klainin-Yobas, P. (2024). Effectiveness of technology-based psychosocial interventions on diabetes distress and health-relevant outcomes among type 2 diabetes mellitus: A systematic review and meta-analysis. Journal of Telemedicine and Telecare, 30(2), 262–284. Doi: 10.1177/1357633X211058329
18. Zarora, R., Immanuel, J., Chivese, T., MacMillan, F., & Simmons, D. (2022). Effectiveness of integrated diabetes care interventions involving diabetes specialists in primary and community care: A systematic review and meta-analysis. International Journal of Integrated Care, 22(2), 1–15. Doi: 10.5334/ijic.6025
19. Zhang, M., Liang, W., & Zhao, W. (2025). Multidisciplinary team cooperative management of a case of severely infected diabetic foot ulcers. WCET Journal, 45(3), 37–43. Doi: 10.33235/wcet.45.3.37-43
20. Centers for Disease Control and Prevention. (2022). Adult Obesity Facts. U.S. Department of Health and Human Services. Available online at: https://www.cdc.gov/obesity/data/adult.html
21. Woods, T., & Miljkovic, T. (2022). Modeling the economic cost of obesity risk and its relation to the health insurance premium in the United States: A state level analysis. Risks, 10(10), 197. Doi: 10.3390/risks10100197
22. Anekwe, C. V., Jarrell, A. R., Townsend, M. J., Gaudier, G. I., Hiserodt, J. M., & Stanford, F. C. (2020). Socioeconomics of obesity. Current Obesity Reports, 9, 272–279. Doi: 10.1007/s13679-020-00398-7
23. Bays, H. E., Munoz-Mantilla, D. X., Morgan, R., Nwizu, C., & Garcia, T. T. (2022). Obesity Pillars Roundtable: Obesity and diversity. Obesity Pillars, 1, 100008. Doi: 10.1016/j.obpill.2021.100008
24. Bays, H. E., Gonsahn-Bollie, S., Younglove, C., & Wharton, S. (2022). Obesity Pillars Roundtable: Body mass index and body composition in Black and female individuals. Race-relevant or racist? Sex-relevant or sexist? Obesity Pillars, 4, 100044. Doi: 10.1016/j.obpill.2022.100044
25. Bays, H. E., Shrestha, A., Niranjan, V., Khanna, M., & Kambhamettu, L. (2022). Obesity Pillars Roundtable: Obesity and South Asians. Obesity Pillars, 1, 100006. Doi: 10.1016/j.obpill.2021.100006
26. Bays, H. E., Ng, J., Sicat, J., & Look, M. (2022). Obesity Pillars Roundtable: Obesity and East Asians. Obesity Pillars, 2, 100011. Doi: 10.1016/j.obpill.2022.100011
27. Bays, H. E., Antoun, J., Censani, M., Bailony, R., & Alexander, L. (2022). Obesity Pillars Roundtable: Obesity and individuals from the Mediterranean region and Middle East. Obesity Pillars, 2, 100013. Doi: 10.1016/j.obpill.2022.100013
28. Tsai, A. G., Abbo, E. D., & Ogden, L. G. (2011). The time burden of overweight and obesity in primary care. BMC Health Services Research, 11, 191. Doi: 10.1186/1472-6963-11-191
29. Martin, B. J., Chen, G., Graham, M., & Quan, H. (2014). Coding of obesity in administrative hospital discharge abstract data: Accuracy and impact for future research studies. BMC Health Services Research, 14, 70. Doi: 10.1186/1472-6963-14-70