PO2.039

Clustering methods for people living with overweight or obesity - A systematic scoping review

De Cock, D.[1]; Schaekers, J.[2]; Schreurs, L.[1]; Riera Arnau, J.[3]; Ahmadizar, F.[4]; Vangoitsenhoven, R.[5]

[1]Biostatistics and Medical Informatics Research Group, Department of Public Health, Faculty of Medicine and Pharmacy, Vrije Universiteit Brussel (VUB), 1005 Brussels, Belgium
[2]Department of Chronic Diseases and Metabolism, Clinical and Experimental Endocrinology, KU Leuven, Leuven, Belgium
[3]Department of Data Science and Biostatistics, Julius Global Health, University Medical Center Utrecht, Utrecht, The Netherlands
[4]Clinical Pharmacology Service, Vall d'Hebron Hospital Universitari, Vall d'Hebron Barcelona Hospital Campus, Universitat Autònoma de Barcelona, Barcelona, Spain
[5]Department of Endocrinology, UZ Leuven, Leuven, Belgium

Introduction: Obesity and its associated comorbidities have become major global health issues. Clustering people with overweight and obesity may improve our understanding of different phenotypes of obesity, which could steer preventive and treatment strategies. Yet, it is unclear which clustering methods are used in obesity research. This scoping review aims to give an overview of clustering methods used to group populations with overweight and obesity, in which groups of people living with overweight and obesity clustering is done, and which variables are used for clustering.
Methods: The following databases were searched systematically from January 1, 2012, up to July 15, 2022: EMBASE, PubMed (including MEDLINE), Web of Science Core Collection, CINAHL and Scopus. Articles were eligible if they included people with overweight and/or obesity and reported any type of clustering method. A diagnosis or classification of overweight or obesity needed to be explicitly mentioned. Case reports and case series, systematic reviews, animal studies and conference abstracts or proceedings were excluded. There was no limit on the age of patients or the degree of adiposity. All studies were screened by two independent reviewers (JS and LS) by title, abstract and full text, using Rayyan. A third reviewer (DDC) was consulted to resolve conflicts. References of the included full texts were screened for eligible studies.
Results: Out of the 13,317 potentially eligible records, 29 studies were included after screening. We found 10 studies using Latent Cluster Analysis, 10 studies using Two-step Cluster Analysis, 5 studies using K-means Cluster Analysis, 2 studies using Hierarchical Cluster Analysis and 2 studies using Latent Profile analysis. These cluster methods have been implemented in various populations of people living with overweight or obesity. Firstly, clustering was done in general populations living with overweight or obesity. Sometimes, specific groups, including children or adults, women, postmenopausal women, and truck drivers were targeted. Interestingly, participants from trial data were clustered to explore the effects of lifestyle interventions post-hoc. Secondly, populations suffering other obesity-related comorbidities, including diabetes type 2, end-stage kidney disease and Metabolic Syndrome, were investigated. Thirdly, populations with eating disorders, such as binge eating, were used for clustering. Finally, patients undergoing bariatric surgery were also clustered. Variables used in the clustering were mostly from multiple sources, including demographics, genetics, cognitive, eating habits, lifestyle factors, psychosocial determinants, and gut microbiome.
Conclusion: This scoping review gives an extensive overview of cluster methods used in people living with overweight and obesity in the last 10 years. Of note, only hard clustering techniques, allocating a person solely to a cluster, were used. Moreover, emerging techniques such as machine learning and artificial intelligence were not frequently used in recent obesity clustering methods.

PO2.040

Metabolic phenotypes of excess body weight and risk of impaired kidney function

Leone, A.[1]; Menichetti, F.[1]; De Amicis, R.[2]; Foppiani, A.[1]; Bertoli, S.[2]; Battezzati, A.[3]

[1]ICANS-DIS Department of Food Environmental and Nutritional Sciences University of Milan Italy
[2]ICANS-DIS Department of Food Environmental and Nutritional Sciences University of Milan Italy, IRCCS Istituto Auxologico Italiano Obesity Unit and Laboratory of Nutrition and Obesity Research Department of Endocrine and Metabolic Diseases Milan Italy
[3]ICANS-DIS Department of Food Environmental and Nutritional Sciences University of Milan Italy, Clinical Nutrition Unit Department of Endocrine and Metabolic Medicine IRCCS Istituto Auxologico Italiano Milan Italy

Introduction: Excess body weight and metabolic syndrome are major public health problems worldwide that frequently coexist, and are both risk factors for reduced kidney function (RKF). However, some people with excess body weight do not present metabolic abnormalities and are considered metabolically healthy (MHEW). Several studies reported that people with excess body weight had a higher risk for RKF, independently from the metabolic phenotype, than healthy people with normal weight. However, it is unknown if MHEW have a different risk of impaired kidney function from metabolically unhealthy people with excess body weight (MUEW).
Methods: A cross-sectional study of 8263 participants (67.5% females, mean age: 47±13 years) with overweight (52.9%) and obesity (47.1%) recruited at the International Center for the Assessment of Nutritional Status (ICANS, University of Milan) was carried out. Anthropometric measurements (weight, height, and waist circumference (WC)), blood pressure, blood parameters (glucose, triglycerides, HDL-cholesterol, and creatinine) were taken. Lifestyle-related information (physical activity and smoking habits) were investigated. MHEW were defined as people with overweight or obesity but free of metabolic abnormalities defined according harmonized criteria for metabolic syndrome (with exclusion of WC). MUEW were defined as people with overweight or obesity and at least one metabolic syndrome criteria (with exclusion of WC). Glomerular filtration rate (eGFR) was calculated through the EPI-CKD predictive formula. Normal renal function was defined as eGFR 90-125 ml/min/1.73m². Higher values indicated hyperfiltration, values ranged 60-89 ml/min/1.73m² a mild RKF, while values <60 ml/min/1.73m² indicated a moderate/severe RKF. A multinomial logistic model adjusted for sex, age, BMI, smoking and physical activity was used to assess the impact of the metabolic phenotypes on the risk of hyperfiltration, mild RKF and moderate/severe RKF, which lead to odd ratio (OR) as measure of association. In the model, people with hyperfiltration, mild RKF and moderate/severe RKF were compared with people with normal renal function.
Results: Overall, the prevalence of MHEW was 27.1% and decreased with increasing obesity class. Overall, 4.0% presented hyperfiltration, 29.8% a mild RKF, and 2.1% had a moderate/severe RKF. eGFR was significantly higher in MHEW people than in MUEW (103.1±16.2 vs. 95.2±17.1 ml/min/1.73m², p<0.001). In the multinomial logistic model adjusted for sex, age, BMI, smoking and physical activity, MHEW were more likely to be affected by hyperfiltration than MUEW (OR=1.41, 95%CI:1.06,1.87, p=0.019). On the other hand, compared to MHEW, MUEW were more likely to be affected by moderate/severe RKF (OR=2.34, 95%CI:1.12,4.89, p=0.023). No association was found between metabolic phenotypes of excess body weight and mild RKF.
Conclusion: Metabolic phenotypes of excess body weight were associated with the risk of impaired kidney function. In particular, people with only excess body weight had a higher risk for hyperfiltration, while the presence of metabolic alterations was associated with a higher risk for moderate/severe RKF.