Barophenotypic Characterization – The key to Person Centric Management of Obesity

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Abstract

Obesity is now recognized as a chronic disease by many international medical societies. However, its comprehensive assessment is still a challenge in most clinical settings. This paper describes a novel practical approach to assess the barophenotype of an individual. The word “barophenotype” is a portmanteau of “baro,” which means weight, and phenotype, which reflects an external expression of a trait. This can be easily assessed using an ABCDE framework, encompassing the Adipose topography, Barophenotypic Behavior, Comorbidity assessment, Dysfunctionality, and Expectations. Furthermore, the utility of this framework in determining an appropriate person-centric therapeutic plan has also been described.

Keywords: Adipose topography, barophenotype, obesity medicine, person centered obesity management

Introduction

Obesity, well-characterized as a disease entity, is diagnosed using body mass index (BMI). The same index is used as a stratification tool and as a target of intervention. BMI, however, does not convey the entire complexity of obesity. The presence or absence of comorbid conditions, which is added as a qualifying scheme, does not do full justice to the syndrome. Models such as Edmonton Obesity Scoring System (EOSS) and Severity of obesity, Expected prognosis, Comorbid conditions, Urgency of control, Risk of complications, Environmental factors, Dysfunction and disability (SECURED) promote a holistic approach to obesity care, whereas the BaroSixer model crafts pragmatic targets, balancing efficacy with safety. These models, too, may not suffice as a descriptive and decision-making tool for all individuals seeking care for obesity.

This situation is similar to that noted in diabetes, which is an equally heterogeneous condition. The concept of glucophenotype and glycemic personality have been found useful in conveying the diabetes status, as well as informing management strategies in diabetes.

The Barophenotype

We propose a similar concept, the barophenotype, or barophenotypic personality, to diagnose and describe obesity, in a person-centered manner. The word “barophenotype” is a portmanteau of “baro,” which means weight, and phenotype, an accepted term in scientific literature.

Barophenotype can be defined as the sum of all attributes, both biophysical and social, which contribute to the overall impact

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of obesity on health. Barphenotype includes the measurement of obesity (by using ethnicity-specific obesity indicators) and adds to its value by describing other obesity-related attributes.\[^{1,9}\]

**Barophenotypic Personality**

The term barophenotypic personality can also be used in place of barphenotype. Both terms have their advantages the latter is crisp and catchy, whereas the former carries a softer, more humane feeling with it.

**The ABCDE of barphenotype**

Irrespective of how we term it, barphenotype can be conveyed by an ABCDE rubric. The alliterative construct is learner-friendly and encourages the student’s interest [Table 1].

A, or adipose topography, includes the severity and style of adiposity. BMI, waist circumference, and fat composition measure the severity of obesity, whereas the relative distribution of fat over various sites of the body provides an overview of its metabolic impact.\[^{10}\] The swiftness with which obesity develops, reverses, or recurs, offers insights regarding the etiology of the disease, behavior of the patient, and appropriate therapeutic options. Adipose topography gives diagnostic clues to the etiology of various disorders like in Cushing’s syndrome there is one particular pattern of fat distribution predominantly over the trunk, upper torso, and face. Similarly, certain endocrine conditions related to insulin resistance, like lipodystrophy syndrome, are fundamentally categorized on the basis of topographic

| Table 1: Barphenotype ABCDE |
|-----------------------------|
| Adipose topography |
| Severity of obesity |
| Style/pattern of weight distribution |
| The swiftness of weight change |
| Syndromic features |
| Barometabolic behavior |
| Diet |
| Exercise/physical activity |
| Addictions |
| Stress and sleep |
| Comorbid status |
| Metabolic status |
| Medical |
| Mechanical |
| Mood |
| Dysfunctionality |
| Emotional |
| Social |
| Biomedical |
| Biophysical |
| Enthusiasm and Expectations |
| Weight loss expectation |
| Willingness to change behavior |
| Financial implications |
| Social support |

Thus, this term “adipose topography” helps in the selection of the molecule for the treatment of the particular disorder (e. g., pioglitazone).

B, viz., barometabolic behavior, is a psychosocial assessment of the individual, encompassing her or his dietary patterns, meal composition, the quantity of food intake and nutrient adequacy; frequency, duration, intensity, and type of physical activity or exercise; and stress levels, sleep hygiene, and substance use/abuse.\[^{9}\]

C, in the ABCDE rubric, implies the status of comorbid conditions and complications. This includes metabolic and endocrine disease such as diabetes, polycystic ovarian syndrome (PCOS), dyslipidemia, and gout, nonalcoholic fatty liver diseases, medical illnesses such as heart failure, obstructive sleep apnea, and cholelithiasis, as well as mechanical or musculoskeletal challenges like osteoarthritis and specific endocrinal alterations other than diabetes attributed to the obesity like late-onset hypogonadism (LOH) and changes in thyroid dysfunction.\[^{6}\]

D, or dysfunctionality, represents the main challenges posed by obesity to quality of life. The emotional, social, or biophysical (such as limitation of exercise capacity, or in locomotion) challenges faced by the patient allow the obesity care provider to craft a meaningful plan of management for him or her.\[^{12}\]

The last letter of our acronym on barphenotype, E, is the strongest reason to term it as barophenotypic personality. The enthusiasm and expectations of the patient play an important role in determining ideation and initiation of therapy, adherence to suggested management protocols, and final outcomes. His or her expectations from a weight loss program, willingness to change behavior, and availability of social/financial support, all contribute to the overall barophenotype.\[^{9}\]

**Application of the ABCDE framework in clinical practice**

The barophenotype is a framework that helps assess and define the impact of obesity on a particular individual. A barophenotypic approach allows the choice of appropriate treatment and monitoring strategies for person-centered obesity care [Table 2]. It also facilitates conversation regarding realistic goal-setting based upon the understanding of the rights and responsibilities of both patient and provider.

The barophenotype utility extends beyond individual clinical care. Analysis of the concept at a macro level can inform health care policy, in terms of provision of health care facilities, including behavioral, nutritional, medical, and surgical support.

**Clinical Implications**

This framework of the barophenotype will guide the clinician to intercept the pathophysiology at its root. Employing this stratification, a holistic strategy to treatment of a chronic disease like obesity can be chalked out as it addresses the obese
person as a whole, including the flexibility and compliance to treatment. In addition, the comorbidities associated with obesity, which are the primary cause of morbidity and mortality are given due importance in this model thereby steering us away from a myopic approach towards the myriad complications.

**Conclusion**

The obesity pandemic is all-pervasive, affecting people regardless of gender, prosperity, or geography.\(^{[13,14]}\) As we face the pandemic of obesity, a holistic approach may be better than a piecemeal approach in dealing with this complex disease. It is important to describe a problem comprehensively, whereas a general approach focuses on obesity as a simple imbalance between energy intake and energy expenditure. This is a flawed concept, as this focuses on “how” obesity occurred. Obesity has a complex origin, from biology, behavior, society, and environment. Hence, we strongly encourage the use of the barophenotype-based characterization, which would instead focus on “why” obesity occurred and offer a multipronged solution for characterizing the disease as well as the person. The wide use of the barophenotype-based characterization would, we feel, fuel holistic thinking, learning, and management of obesity, and eventually help us better manage the millions of people affected by obesity and its complications.

As we face the pandemic of obesity, a piecemeal approach in dealing with this complex disease may not yield rich dividends. Hence, we strongly encourage this multipronged approach in characterizing the disease as well as the person, in order to achieve treatment success.

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**Conflicts of interest**

There are no conflicts of interest.

**References**

1. Kapoor N, Furler J, Paul TV, Thomas N, Oldenburg B. Ethnicity-specific cut-offs that predict co-morbidities: The way forward for optimal utility of obesity indicators. J Biosoc Sci 2019;51:624-6.
2. Verma M, Das M, Sharma P, Kapoor N, Kalra S. Epidemiology of overweight and obesity in Indian adults - A secondary data analysis of the National Family Health Surveys. Diabetes Metab Syndr 2021;15:102166.
3. Kapoor N, Furler J, Paul TV, Thomas N, Oldenburg B. The BMI-adiposity conundrum in South Asian populations: Need for further research. J Biosoc Sci 2019;51:619-21.
4. Kapoor N, Lotfaliany M, Sathish T, Thankappan KR, Thomas N,
Furler J, et al. Prevalence of normal weight obesity and its associated cardio-metabolic risk factors - Results from the baseline data of the Kerala Diabetes Prevention Program (KDPP). PloS one 2020;15:e0237974.
5. Kalra S, Kapoor N, Kota S, Das S. Person-centred obesity care - Techniques, thresholds, tools and targets. Eur Endocrinol 2020;16:11-3.
6. Kapoor N, Kalra S, Kota S, Das S, Jiwanmall S, Sahay R. The SECURE model: A comprehensive approach for obesity management. J Pak Med Assoc 2020;70:1468-9s.
7. Kalra S, Iraqi H, Sahay R, Bhattacharya S. The glycaemic personality: A SURE framework of person-centred choice in diabetes care. J Pak Med Assoc 2020;70:1285-6.
8. Kalra S, Gupta Y. The gluco-phenotype. J Pak Med Assoc 2016;66:118-9.
9. Kapoor N, Lotfaliany M, Sathish T, Thankappan KR, Thomas N, Furler J, et al. Obesity indicators that best predict type 2 diabetes in an Indian population: Insights from the Kerala Diabetes Prevention Program. J Nutr Sci 2020;9:e15.
10. Kapoor N, Jiwanmall SA, Nandyal MB, Kattula D, Paravathareddy S, Paul TV, et al. Metabolic Score for Visceral Fat (METS-VF) estimation - A novel cost-effective obesity indicator for visceral adipose tissue estimation. Diabetes Metab Syndr Obes 2020;13:3261-7.
11. Brown RJ, Araujo-Vilar D, Cheung PT, Dunger D, Garg A, Jack M, et al. The diagnosis and management of lipodystrophy syndromes: A multi-society practice guideline. J Clin Endocrinol Metab 2016;101:4500-11.
12. Ramasamy S, Joseph M, Jiwanmall SA, Kattula D, Nandyal MB, Abraham V, et al. Obesity indicators and health-related quality of life - Insights from a Cohort of morbidly obese, middle-aged South Indian women. Eur Endocrinol 2020;16:148-51.
13. Kalyan M, Dhore P, Purandare V, Deshpande S, Unnikrishnan AG. Obesity and its link to undiagnosed diabetes mellitus and hypertension in rural parts of Western India. Indian J Endocrinol Metab 2020;24:155-9.
14. Foreyt J, Goodrick K. The ultimate triumph of obesity. Lancet (London, England) 1995;346:134-5.