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EDITORIAL



Is obesity a disease?

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1. Introduction

Shakespeare said that a rose by any other name would smell as sweet. Analogously, obesity as a clinical entity based on its current definition of a BMI >30Kg/m² remains essentially the same thing, whatever we name it. Unfortunately however, BMI which is calculated from just two basic anthropometric measurements, is seriously limited as a sole diagnostic criterion for obesity. It is accepted that on a population-based epidemiological level, BMI appears to perform well as a measure of adiposity [1]. Although BMI usually also correlates well with adiposity on an individual level, 'excessive adiposity' as a concept seems quite subjective. Furthermore, BMI also correlates with muscularity, and therefore stumbles as a definition of obesity in some people with excessive muscularity. Finally, 'excessive adiposity' may occur at a BMI <30Kg/m² in some people with sarcopenia for example. BMI as an indicator of 'excessive adiposity' is therefore inherently flawed, particularly in those people with abnormal body habitus. A further limitation of BMI is that it provides no indication of body fat *distribution*. It is well-established that fat distribution (such as visceral versus subcutaneous gluteal fat) influences risk of metabolic dysfunction and co-morbidity development [2]. Although waist circumference is a useful measure of visceral fat, this measurement does not feature as a diagnostic criterion for obesity based on its current definition.

With these diagnostic limitations in mind, there are three main arguments to discuss when considering whether obesity should be classified as a disease.

2. The 'collective acceptance' argument

'Collective acceptance' is used here to define a scenario whereby a group, population or nation shares collectively in a particular belief without question. An example here would be the value of a £5 note. Humans seem to have great ability to share collective beliefs, even when this belief provokes cognitive dissonance. The American Medical Association labelled obesity as a disease in 2013 [3], and this move was followed by other esteemed societies. Such conformity has set the stage for collective acceptance within the medical community, that obesity should be labelled as a disease.

The collective acceptance perspective is, perhaps less of an argument for obesity being a disease, as an explanation for prevailing view-points. If we look back a few decades, esteemed societies viewed obesity more as a risk-factor than disease, and the collective perspective then within the medical community was aligned accordingly. Since then, although obesity remains the same thing, our collective perspective regarding its disease status has changed radically.

The purpose of including this discussion of 'collective acceptance' is not so much to argue for or against obesity being a disease, but rather a warning for us to understand our human propensity for collective acceptance of prevailing beliefs. Such collective acceptance could legitimately be used to argue for obesity being a disease within our collective imagination, just as we can all agree on the value of a £5 note. But that collective acceptance and belief per se counts for nothing when arguing for whether obesity should be classed as a disease from a *scientific* perspective.

3. The scientific argument

A disease is defined as a disordered or incorrectly functioning organ, part, structure or system of the body. In other words, pathophysiology justifies disease status. To define obesity as a disease scientifically therefore, we must identify its underlying pathophysiology. What is incontrovertible is that obesity (and its antecedent weight-gain) associates with the development of multiple diseases that include Type 2 Diabetes Mellitus and Polycystic Ovary Syndrome for example [4,5]. However, association per se is not equivalent to pathophysiology, and should not therefore be used solely as a scientific argument to label obesity with disease status.

In a subgroup of those with obesity, ectopic fat deposition within liver and muscle ensues, often accompanied by a chronic inflammatory process within adipose tissue which is thought to contribute toward insulin resistance and increased risk of cardiovascular events [6]. In this scenario, it could be argued justifiably that obesity should be labelled with disease status. The disordered structure is the ectopic fat deposition and the over-abundant and inflamed adipose tissue, each contributing toward a pathophysiological process. Analogously, hypertension and dyslipidaemia can also be labelled with disease status

based on their underlying pathophysiological processes, which also associate with increased risk of cardiovascular events. In each of these examples, disease status is justified on the basis of underlying *pathophysiology*, and is not dependent upon their association with (including presence or absence of) cardiovascular events per se.

In another subgroup of those with obesity however, particularly in younger people or those with more recent weight-gain, 'excessive adiposity' appears to be confined to a eutopic distribution, with relative absence of ectopic fat deposition. There may also be relative absence of an adipogenic inflammatory reaction or even insulin resistance [7]. I would argue that in this subgroup of the obese, a physiological (and protective) process ensues whereby expansion of eutopic adipose tissue depots occurs in response to chronic over-nutrition. While it is accepted that this physiological process often becomes pathophysiological over time (as described earlier in this section), this does not appear inevitable, and misses the point of this scientific argument: In this important subgroup (at least transiently), disordered tissues, malfunctioning systems, and pathophysiology do not appear to exist. It would be difficult to argue that such a physiological scenario should be classified as disease status. And yet, if we are to label obesity with the umbrella terminology of disease status then this real-life scenario, by our current BMI-centric definition, needs to be included.

4. The utilitarian argument

Regardless of its labelling by esteemed societies or its scientific merits, the question remains whether classifying obesity as a disease is beneficial for patients. There is a strong argument that disease-status would provide a mandate for governments to take obesity more seriously, and to provide more funding for obesity-related treatment strategies such as metabolic surgery [3]. This is particularly apt in the UK, where provision of metabolic surgery for morbidly obese patients per capita is among the worst in the whole of Western Europe [8]: a shameful indictment which is simply unacceptable and cannot be justified. Furthermore, labelling obesity as a disease may raise its profile among charitable societies, and promote more funding for research into the prevention and effective management of obesity.

Labelling obesity as a disease also has potential to change societal views. While it is hoped that this would diminish stigmatization of obesity, evidence to support the likelihood of this outcome is lacking. Certain diseases (leprosy and AIDS as examples) have been associated with much stigmatization [9]. Disease-status per se may therefore even have potential to worsen stigmatization of a condition. A further concern is that labelling obesity as a disease may reduce motivation of some patients to improve their lifestyle. Healthcare professionals need to ensure that their obese patients understand that their 'disease' is potentially reversible through effective changes in eating- and activity-related behaviors.

5. Concluding remarks

There is much stigmatization of obesity within our society. Many misconceptions about obesity and its causes are prevalent, and much discrimination exists. Ultimately, greater funding for obesity-related management strategies and research is desperately needed. It would seem reasonable to posit that labelling obesity as a disease would help to satisfy this unmet need. However, what is really required is *cultural transformation*. While labelling obesity as a disease may form one part of this, it would be naïve to assume that this alone would change our culture and society. Cultural transformation will likely be a slow and gradual process, and will need to include proactivity from *all* elements of society. Essential expedients of this process should include radical changes to the way in which obesity and its causes are portrayed to the public by the media, government campaigns to promote a clearer understanding of obesity and its causes within society, and perhaps most importantly, clear education of our children on obesity and its causes. If labelling obesity as a disease will facilitate these changes, then it seems reasonable to assume that this will also result, ultimately in improved care, experiences and wellbeing of our obese patients.

The usefulness of obesity as a clinical entity rests primarily on its association with co-morbidities that include metabolic dysfunction. Although not directly relevant to the current definition of obesity per se (and perhaps out of place in this discussion), it is however illuminating to envision a future scenario in which the definition of obesity is replaced with a concept that is less adipo-centric, and more cardio-metabolically refined: a new concept to reflect more accurately future cardio-metabolic risk, thereby providing greater clinical utility. In addition to inclusion of measures of fat distribution (such as waist circumference for visceral fat [2]) into such a new definition, a measure of cardio-respiratory fitness (CRF) should also perhaps be incorporated. There is much evidence in the literature to promote the association of sedentariness with metabolic dysfunction, and the utility of physical activity and non-sedentary behavior to improve metabolic health [10,11]. Although CRF is generally measured on a maximal stress test, estimation of CRF can also be made from non-exercise based data [12]. Exploration of future accurate biomarkers for CRF would seem an important focus for future research, and would help to establish CRF as a diagnostically useful entity, rather than one based primarily within the research sphere.

To conclude, on the basis of the arguments outlined, it would seem reasonable to support the labelling of obesity with disease status, on the proviso that we also take the timely opportunity to re-think, modify and refine our definition of obesity, to one that more accurately reflects underlying pathophysiology, and therefore associated cardiovascular risk. Transforming our definition of obesity to more accurately reflect disease status will require transformation away from anachronistic BMI-centricity. Our new definition should reflect perhaps fat distribution, ectopic

fat deposition and CRF, whilst also being applicable clinically.

Einstein said that insanity is when we do the same thing over and over and expect different results. If we want improved, rather than the same dismal results for our obese patients, we have to do things differently. Modifying our perspective on obesity through labelling it as a disease could prove one useful expedient for much needed cultural transformation. We should still leave room though, within our transformation for healthy debate and consensus on a more refined disease-centric definition of obesity.

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Declaration of interest

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- **This study demonstrates through use of MRI that obese women with PCOS have global distribution of fat rather than a preponderance of visceral fat compared to BMI-matched control women.**
 - **This study outlines inflammation within adipose tissue as an important pathogenic factor associated with obesity.**
 - **This study outlines the importance of sedentariness as a risk factor for the development of metabolic dysfunction.**
 - **This study outlines the importance of cardiorespiratory fitness as an important determinant of metabolic health, and one that should ideally be measured as part of clinical assessment.**