The mediating effect of Chronic Pain on the relationship between obesity and physical function and disability in older adult


Background
Obesity leads to chronic medical conditions (DM, CAD, OA), cause gait and balance disturbances (mobility difficulties) and even be associated with muscle and bone loss excess adipose tissue (inflammation)
The hazard of physical disability is particularly relevant in older populations because the risk of functional problems increases with advancing age. The extent to which pain may contribute to obesity related physical disability is not known.

Objective
Understand how pain may mediate the association between obesity and physical disability, performance and function.

Premises

- High BMI and greater arthritic and non-arthritic bodily pain
- Moderate obesity Vs wnl weight, 2x odds chronic pain and severe obesity having 4x more pain

Hypothesis
Pain could be an important under-recognized mechanism by which obesity leads to disability

Population: 736 community-dwelling adults aged 70 and older form MOBILIZE study (MBS)+Spouses/companions >64yo. 744 were eligible, 8 excluded (low BMI)

Design/methods
Cross sectional analysis using a mediation analysis

Baron and Kenny

Step 1: Show that the causal variable is correlated with the outcome. Use Y as the criterion variable in a regression equation and X as a predictor (estimate and test path c in the above figure). This step establishes that there is an effect that may be mediated.

Step 2: Show that the causal variable is correlated with the mediator. Use M as the criterion variable in the regression equation and X as a predictor (estimate and test path a). This step essentially involves treating the mediator as if it were an outcome variable.

Step 3: Show that the mediator affects the outcome variable. Use Y as the criterion variable in a regression equation and X and M as predictors (estimate and test path b). It is not sufficient just to correlate the mediator with the outcome because the mediator and the outcome may be correlated because they are both caused by the causal variable X. Thus, the causal variable must be controlled in establishing the effect of the mediator on the outcome.
Step 4: To establish that M completely mediates the X-Y relationship, the effect of X on Y controlling for M (path c') should be zero. The effects in both Steps 3 and 4 are estimated in the same equation.

Measurements:
BMI (wnl, overweight, obese)
Physical Component Summary (PCS)-12 Q’s, # 50+/-10 (8 health domain measures)
ADL’s (bath, eating, transferring, toileting, dress)-Disability Vs no disability
Short physical performance Battery (SPPB), Pain (weight bearing joint sites)-Lower extremity mobility performance (0-12)
Joint pain questionnaire from women health and aging study (1ry analysis), Brief pain inventory (2ry analysis)

Results
Critique
Obesity associated w/ greater ADL disability and worse physical functioning, greater distribution of pain sites (pain also was independently assoc w/ poor physical Fx)
-Intensity of pain was not associated with weight category (not mediated relationship between obesity/physical Fx/disability), therefore pain could not mediate
-Confirms association between obesity and greater likelihood of and distribution of pain

Premises
-Pain: 1-2 body areas $\rightarrow$ 30% greater risk of mobility limitations; 3 or more $\rightarrow$ 80% greater risk of physical limitations

The result of this study confirm previously confirm associations (obesity and disability), sex (woman) being most common.
-Obese older woman have poorer physical function then the normal weight counterpart

Premises
-Women (not men) w/ high BMI had greater risk mobility problems as well was prevalence disability in ADL’s or IADL’s

Pros:
-Multiethnic, population –based base
-Analysis of disability, physical (performance –base and self-reported) measures
-Measure pain in multiple sites
-Model adjusted for co variables: ie: Age, sex, race, education, smoking status, physical activity and chronic medical conditions

Cons:
-Cross sectional design did not allow temporality of the factors of interest to be establish (Could not definitely establish casual inference between obesity and the development of pain and disability)
- Limited in measuring cognitive impairment, mood disorder and married status
- Cannot exclude possibility that older adults 1st developed pain + disability and then develop obesity
- Not body composition was measure

**Conclusion**
The mediation analysis suggest that bodily pain mediates approx 22% to 44% of the total observed adverse effect of obesity on disability and physical function in women (may be an important treatable condition)

**(Table 3)**
- Data suggest that weight loss related interventions to prevent functional decline may be the best targeted toward women
- Obesity and disability are complex conditions and thus pathogenesis is likely multifactorial.
- Need develop tools better pan assessment

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