

ORIGINAL RESEARCH

Evaluation of Effects of Obesity on Infections with focus on Skin Infections: An Institutional Based Study

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Received: 09 October, 2020

Accepted: 21 November, 2020

ABSTRACT

Background: Obesity affects the immune response leading to an increased susceptibility to infections. Obese adults and children show an increased incidence of both nosocomial and community-acquired infections. The present study was conducted to assess the effects of obesity on infections with focus on skin infections. **Materials & Methods:** In the present study, a total of 380 participants with BMI ≥ 25 kg/m² were included. Height and weight were self-reported in the questionnaire and BMI was. Infections were noted. Data was analyzed using SPSS version 21. p value ≤ 0.01 considered statistically significant. **Results:** In the present study, 41.05% participants were males and 58.94% were females. Mean age was 49.8 years. The most common site for infections was the upper respiratory tract among females (23.21%) and the lower respiratory tract among males (21.79%). Skin And Subcutaneous Tissue Infections occur in 12.8% males and 10.71% females. **Conclusion:** The present study concluded that obesity was associated with increased risk of infections in both genders. Skin And Subcutaneous Tissue Infections occur in 12.8% males and 10.71% females.

Keywords: Obesity, Risk, Infections, Skin.

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INTRODUCTION

Obesity is a global health concern with the World Health Organization, estimating 500 million adults to be obese (body mass index (BMI) >30) in 2008.¹ Obesity is an excess of body fat that is detrimental to health and is often assessed clinically by the body mass index (BMI).² According to the World Health Organization definition, a person is considered overweight if her/his body mass index (BMI) is >25 , and obese if BMI is ≥ 30 .³ Obesity is a complex inflammatory chronic condition that affects both children and adults and has become a worldwide epidemic. Diets enriched in fat and calories and a sedentary lifestyle with limited physical activity are usually blamed for the increase in the prevalence of obesity. The most visible sign of obesity is accumulation of body fat⁴, usually measured by body

mass index (BMI) ≥ 30 kg/m² as stated by the Centers for Disease Control and Prevention (CDC). BMI however only measures total body weight without taking into account changes in body fat⁵ as well as the location of the fat, visceral versus subcutaneous, which is important as the accumulation of fat between different depots is more important than the amount of total fat in the body for the risk of developing obesity-associated conditions. The subcutaneous adipose tissue (AT) is generally located in lower parts of the body, and is measured by hip, thigh and leg circumference, but can also accumulate in the area around the neck. The visceral AT surrounds internal organs and includes omental, mesenteric, epididymal, perirenal, retroperitoneal, epicardial.⁶ Several studies have also shown body mass index (BMI) to be associated with increased risk of

infections.^{7,8} Mechanisms that predispose obese patients to infections include decreased cell-mediated immune responses, immune system dysregulation, respiratory dysfunction, underlying comorbidities, and altered pharmacokinetic and pharmacodynamics parameters.⁸⁻¹⁰ A 2017 study of American women found that skin barrier and moisturizing functions were significantly impaired by obesity, resulting in considerable dryness and roughness, compared with nonobese women.¹¹ The present study was conducted to assess the effects of obesity on infections with focus on skin infections.

MATERIALS & METHODS

In the present study, 500 participants who were completing a questionnaire on anthropometric measures were included. Participants younger than 18 years, subjects with missing data on height or weight, or underweight (BMI <18.5 kg/m²) were excluded from the study. Height and weight were self-reported in the questionnaire and BMI was calculated as weight in kilograms divided by height in meters squared. BMI was categorized according to the WHO standard classification into normal weight (≥18.5 to

<25 kg/m²; reference), overweight (≥25 to <30 kg/m²) and obesity (≥30 kg/m²).¹² 380 participants with BMI ≥25 kg/m² were included in the study. Community acquired infections were defined according to the International Classification of Diseases (ICD), Tenth Revision (ICD-10). To avoid nosocomial infections, only the primary inpatient or outpatient diagnosis code was used. Infections were grouped as upper respiratory tract infections, lower respiratory tract infections, gastrointestinal tract infections, skin and subcutaneous tissue infections, urinary tract infections, gynaecological infections, sepsis, and other infections. Data was analyzed using SPSS version 21. p value ≤0.01 considered statistically significant.

RESULTS

In the present study, 41.05% participants were males and 58.94% were females. mean age was 49.8 years. The most common site for infections was the upper respiratory tract among females (23.21%) and the lower respiratory tract among males (21.79%). Skin And Subcutaneous Tissue Infections occur in 12.8% males and 10.71% females.

Table 1: Demographic data of patients with BMI ≥25kg/m²

Variables	N(%)
Gender	
Male	156(41.05%)
Female	224(58.94%)
Mean Age (years)	49.8 ± 1.2

Table 2: Total number of infections stratified by gender, infection type

Infections	Male n(%)	Female n(%)
Upper Respiratory Tract Infection	20(12.8%)	52(23.21%)
Lower Respiratory Tract Infection	34(21.79%)	30(13.39%)
Gastrointestinal Tract Infections	16(10.25%)	18(8.03%)
Skin And Subcutaneous Tissue Infections	20(12.8%)	24(10.71%)
Urinary Tract Infections	22(14.10%)	38(16.96%)
Gynecological Infection	0(0%)	20(8.92%)
Sepsis	10(6.4%)	4(1.78%)
Others	34(21.79%)	3(1.33%)

DISCUSSION

Epidemiological data has begun to emerge that indicates obesity is a risk factor for infectious diseases.¹³ First, adipose tissue secretes adipokines, including leptin and adiponectin, that modulate the immune response.^{9,10} Second, an altered respiratory physiology, skin folds and diminished peripheral blood perfusion are factors linked to obesity which might induce an increased risk for respiratory tract infections, skin infections and abscesses, respectively.¹⁴ Lastly, the differences observed between males and females might be due to diverse anatomical constructions.¹⁴

In the present study, 41.05% participants were males and 58.94% were females. mean age was 49.8 years. The most common site for infections was the upper respiratory tract among females (23.21%) and the

lower respiratory tract among males (21.79%). Skin And Subcutaneous Tissue Infections occur in 12.8% males and 10.71% females. Data on the association between obesity and the outcome of skin infections are limited. A prospective cohort study has indicated the outcome of cellulitis to be worse in the morbidly obese as compared with non-obese subjects.¹⁵

Obesity increases risk of gastrointestinal complications such as non-alcoholic fatty liver disease (NAFLD). Several authors have demonstrated that obesity is a risk factor for the development of steatosis in patients with chronic hepatitis C infection, as BMI correlates with the grade of steatosis.¹⁶

Moreover, obese subjects are more prone to develop various skin infections such as intertrigo, candidiasis, furunculosis, erythrasma, tinea cruris, and folliculitis

and to show rapidly progressive bacterial bone and joint infections.⁹

Campitelli MA, et al observed higher rates of outpatient visits for Acute Respiratory Infections during influenza season periods compared with normal weight individuals for those who were overweight (BMI 25–29.9; rate ratio (RR) 1.10; 95% confidence interval (95% CI) 1.07–1.13), obese class I (BMI 30–34.9; RR 1.17; 95% CI 1.13–1.22) and obese class II or III (BMI X35; RR 1.19; 95% CI 1.12–1.25). Associations of a similar magnitude were observed during non-influenza season periods.¹⁷

CONCLUSION

The present study concluded that obesity was associated with increased risk of infections in both genders. Skin and subcutaneous tissue infections occur in 12.8% males and 10.71% females.

REFERENCES

1. World Health Organization. Obesity and overweight <http://www.who.int/mediacentre/factsheets/fs311/en/index.html>. 2012. 8-15-2012.
2. González-Muniesa P, Martínez-González M-A, Hu FB, Després J-P, Matsuzawa Y, Loos RJF, et al. Obesity. *Nat Rev Dis Primers* (2017) 3:17034. doi: 10.1038/nrdp.2017.34
3. WHO. WHO obesity: preventing and managing the global epidemic. Report of the WHO consultation. *World Health Organ Tech Rep Ser* 2000; 894: 1–253.
4. Kyle TK, Dhurandhar EJ, Allison DB. Regarding Obesity as a Disease: Evolving Policies and Their Implications. *Endocrinol Metab Clin North Am*. 2016; 45(3): 511–520.
5. Nuttall FQ. Body Mass Index: Obesity, BMI, and Health: A Critical Review. *Nutr Today*. 2015; 50(3): 117–128.
6. Bjorndal B, Burri L, Staalesen V, et al. Different adipose depots: their role in the development of metabolic syndrome and mitochondrial response to hypolipidemic agents. *J Obes*. 2011; 2011: 490650.
7. Dobner J, Kaser S. Body mass index and the risk of infection—from underweight to obesity. *Clin Microbiol Infect* 2018;24:24–28.
8. Huttunen R, Syrjanen J. Obesity and the risk and outcome of infection. *Int J Obes (Lond)* 2013;37:333–40.
9. Falagas ME, Kompoti M. Obesity and infection. *Lancet Infect Dis* 2006;6:438–46
10. Karlsson EA, Beck MA. The burden of obesity on infectious disease. *Exp Biol Med (Maywood)* 2010;235:1412–24.
11. Mori S, Shiraiishi A, Eppelen K, et al. Characterization of skin function associated with obesity and specific correlation to local/systemic parameters in American women. *Lipids Health Dis*. 2017;16(1):214. doi: 10.1186/s12944-017-0608-1
12. World Health Organization. Obesity: Preventing and Managing the Global Epidemic: Report of a WHO Consultation. Geneva, Switzerland: World Health Organization, 2000.
13. Huttunen R, Syrjanen J. Obesity and the risk and outcome of infection. *Int J Obes* 2012; 37: 333–340.
14. Kaspersen KA, Pedersen OB, Petersen M et al. Obesity and risk of infection: results from the Danish Blood Donor Study. *Epidemiology* 2015;26:580–89.
15. Carratala J, Roson B, Fernandez-Sabe N, Shaw E, del Rio O, Rivera A et al. Factors associated with complications and mortality in adult patients hospitalized for infectious cellulitis. *Eur J Clin Microbiol Infect Dis* 2003; 22: 151–157.
16. Younossi ZM, McCullough AJ, Ong JP, Barnes DS, Post A, Tavill A et al. Obesity and non-alcoholic fatty liver disease in chronic hepatitis C. *J Clin Gastroenterol* 2004; 38:705–9.
17. Campitelli MA, Rosella LC, Kwong JC. The association between obesity and outpatient visits for acute respiratory infections in Ontario, Canada. *International journal of obesity*. 2014 Jan;38(1):113-9.