INTERNATIONAL RESEARCH JOURNAL OF PHARMACY

www.irjponline.com

ISSN 2230 – 8407

Research Article

NATIONAL ESTIMATION OF YEARS LIFE WITH DISABILITY (YLD) ATTRIBUTABLE TO OVERWEIGHT AND OBESE AMONG INDONESIAN ADULTS

Susi Ari Kristina [1]* , Dwi Endarti [1], Abdillah Ahsan [2], Faradiba [3], Shahiroh Haulaini [3]

[1]Department of Pharmaceutics, Faculty of Pharmacy, Universitas Gadjah Mada, Yogyakarta, Indonesia

[2]Demographic Institute, Faculty of Economics and Business, Universitas Indonesia, Jakarta, Indonesia

[3]Undergraduate Program, Faculty of Pharmacy, Universitas Gadjah Mada, Yogyakarta, Indonesia

*Corresponding Author Email: susiari_k@ugm.ac.id

Article Received on: 05/12/18 Approved for publication: 02/01/19

DOI: 10.7897/2230-8407.100247

ABSTRACT

Obesity has become a major public health problem worldwide. High prevalence of obesity increased burden from non-communicable diseases. The burden of overweight and obese was calculated in this study from a payer perspective. The objective of the study was to estimate the burden of disease attributable to overweight and obesity among males and females aged 18 years and older using years of life with disability (YLD). An epidemiological study using prevalence based approach was used. An epidemiological study was conducted. Study period in the year of 2015 using data from GLOBOCAN, a database of *International Agency for Research on Cancer* (IARC) and National Social Security System was used. The incidence of ten diseases occurred between January 2015 and December 2015 were analyzed. Ten basic causes of diseases associated with overweight or obesity were included. The obesity attributable fraction (OAF), Obesity attributable incidence (OAI) and YLD were estimated. The overall burden attributable to overweight and obese was 495,940 cases and the estimated YLD per 10,000 persons was 241.5. Hypertension and type 2 diabetes mellitus were the most two causes of YLD (213.8 and 6.2 YLD per 10,000 persons consecutively). Obesity is substantial risk factor of non-communicable diseases that are main causes of loss of productivity. Burden of disease estimates attributable to overweight and obese can be used to inform population health monitoring, health policy formulation, health service planning and health promotion and management strategies.

Keywords: overweight; obese; YLD; diseases; Indonesia

INTRODUCTION

Obesity has become pandemic worldwide. Excess body weight is a major risk factor for premature mortality, cardiovascular disease, type 2 diabetes mellitus, osteoarthritis, certain cancers, and productivity lost.[1-3] According to the Global Burden of Diseases (GBD) study, in 2010 exposure to obesity was estimated to cause 3.4 million deaths [4] and will soon overtake smoking as the primary preventable cause of death if current trends continue. Indeed, obesity is associated with greater morbidity and poorer health-related quality of life than smoking and alcohol drinking.[5, 6] Despite this, excess body weight has not received the same attention from health professionals and policymakers as have other threats to health such as tobacco use and alcohol drinking. Given these circumstances, it is not surprising that obesity rates continue to climb, even as significant reductions in other risk factors have been achieved.

Although powerful environmental forces drive the pandemic of excess body weight, health care professionals can help to counteract these trends by educating patients about the health impacts of obesity and recommend to the patients, such as regular physical activity and healthy diet.[7] The GBD methodology has been used at country-level to obtain local measurements of interest topic include obesity called DALYs (Disability adjusted life years).[8] It can provide clinicians with a valuable metric for concisely and tangibly conveying the deleterious effect of obesity to overweight individuals. DALYs for a disease or health condition are calculated as the sum of the Years of Life Lost (YLL) due to premature mortality in the population and the Years Lost due to Disability (YLD) for people living with the health condition or its consequences. Years of life lost (YLL) defined as the difference between the number of years that one would be expected to live if one were not obese and life expectancy if one were obese and years life with disability (YLD) as the number of years where individuals getting sick due to obesity.[9] By combining nationally representative databases in a novel and creative analysis, the evidence show that as degree of overweight increases, a striking and steady contraction of life span and productivity loss occurs.

Thus, the powerful simplicity of the YLD metric as a tool for clinicians and policy makers, it exposes portion of the toll of obesity. However, the use of a single outcome to determine what constitutes a healthy weight and to set public health goals for weight reduction has limitations. A summary measure that incorporates information on the adverse impact of excess weight on morbidity and quality of life as well as on mortality may be preferable. The number of healthy (i.e., disability-free) is an alternative that could be developed and used by health care professionals and policymakers to highlight the total risk of obesity.[2] Computing disability-adjusted life-years is clearly more complicated than calculating YLD, since subjective decisions would be required to determine what constitutes a disability and to develop severity-of-disability ratings by which to adjust the statistic. Until such a measure is developed, however, the YLD metric provides a useful strategy to illustrate the most tangible cost of obesity.

To our knowledge, there are not published studies regarding national estimation of burden of disease attributable to overweight or obesity in Indonesia. From a public health perspective, and in order to minimize the impact of overweight and obesity-related mortality through the implementation of

health policies, the accurate measurement of the burden of disease is fundamental.[5] The aim of this study was to estimate the burden of overweight and obese among adults in Indonesia using the YLD indicator. In addition, the diseases impact on disability were estimated.

MATERIALS AND METHODS

Study design

An epidemiological study was conducted. Study period in the year of 2015 using data from GLOBOCAN, a database of *International Agency for Research on Cancer* (IARC) and National Social Security System was used. The incidence of ten diseases occurred between January 2015 and December 2015 were analyzed.

Study population

Individuals aged 18 years and older at incidence of specific diseases were enrolled. According to the WHO global health observatory database 2010, 17.3% of adult Indonesian men and 25.2% of women were classified as overweight (BMI 25-30 Kg/M2).[4, 10] Ten underlying causes of morbidity (International Classification of Diseases _ 10th revision, ICD-10) were included: colon and colorectal cancer, pancreas cancer, breast cancer, ovarian cancer, endometrial cancer, diabetes mellitus, hypertension, ischemic heart disease, asthma, and stroke.[1, 11, 12]

Relative risks

The parameter of relative risks (RRs) sub-grouped by sex were estimated by updated published meta-analysis; this meta-analysis evaluated the association of overweight and obese with the chronic diseases .[13]

Statistical analysis

We calculated the burden of disease attributable to overweight and obese. First, the population attributable fraction (PAF) was estimated for each disease as the fraction of disease incidence that is attributable to risk factor, and the prevalence of overweight and obesity among Indonesian adults (18 years old and more).[9] The PAF quantifies the proportional number of cases that would potentially be associated with particular risk factor (overweight or obesity). Second, age-specific YLD by diseases were estimated following the GBD (Global Burden of Diseases Study) standardized tool. YLD formula is as follow:

$$YLD = I \times DW \times L$$

Where:
I : Number of incidence attributable to overweight and obesity
DW: *disability weight of each disease, within the interval of 0-1.*
L: duration of disease stage (year) which is derived from *software* DISMOD II.[8]

Template from the GBD study were used to compute the YLD, and the summary statistics were estimated using Microsoft Excel. Finally, the YLL (year) were estimated.

Ethical considerations

This study was approved by the Local Research and Ethics on Health Research Committee with an approval number KE/FK/0265/EC/2017. Data regarding identification of individuals included in the study sample were omitted in order to preserve their anonymity.

RESULTS

The overall relative risk estimates and OAFs for obesity and the 10 co-morbidities, disaggregated by gender, are presented in Table 1. OAF estimates indicate that about 12.55% to 42.39% of all deaths of diabetes mellitus, 1.77% to 16.78% of all deaths of ischemic heart disease, and 11.78% to 11.93% of all deaths of endometrial cancer in Indonesia are attributable to obesity.

Data from 4,190,749 participants, consisted of 2,771,307 male and 1,419,442 female for which incidence was attributable to overweight or obesity, were analyzed. Table 2 shows the number of deaths attributable to overweight or obesity by sex. Female proportion in incidence due to overweight and obesity was 63.3% (314,062 from a total of 495,940). The leading causes of incidence are presented in Table 2. Hypertension and type 2 diabetes mellitus represented the main cause of morbidity (433,382 and 26,678 persons, respectively). The overall estimated burden to cancers was 5,904, consisted of 1,327 in males and 4,577 females. Endometrial cancer and colorectal cancer had the highest site-specific burden, 2,252 and 2,202 cases respectively.

The overall burden of disease attributable to overweight and obesity was 2,415,953 YLD (Table 3). Among males, the estimated YLD due to overweight and obese were 704,005 and 313,314 respectively. The number of YLD, among females, attributable to overweight and obese were 884,215 and 514,418 respectively. YLD was higher in female than in male (1,398,633 in female and 1,017,319 in male). The overall estimate of YLD by disease showed that hypertension and ischemic heart disease (IHD) had the highest YLD, 2.138.862 and 105.265 years-person respectively. YLD of cancers represented 9.850 with the highest was endometrial cancer and colorectal cancer, 4.002 and 3.939 year-person respectively.

DISCUSSION

Our findings suggest that, in Indonesia, by measuring 10 specific causes of morbidity, the attributable burden of overweight and obesity was 1,017,319 and 1,398,633 YLD in adult males and females, respectively. The YLD for all incidences in the study period are 2,415,953 years-person. The overall proportion of YLD attributable to the exposure to overweight and obese is 33.6% and 63.3% in males and females, respectively. Therefore, among adults >18 years old, an average of 2.4 million YLD may be prevented annually by the implementation of health policies focusing on the reduction of exposure to overweight and obese. Chronic diseases were the main cause of morbidity, with the aggregated morbidity rate of hypertension and type 2 diabetes mellitus was 433,382 and 26,678 incidences respectively.

Overweight and obese are major risk factors for these degenerative diseases. Hypertension, ischemic heart disease, and type 2 diabetes mellitus was the non-communicable diseases with the highest burden in both sexes, more than 85% of YLD were secondary to this cardiovascular diseases. Similar findings were previously observed in other populations. Epidemic characteristics of cardiovascular diseases have been observed in Indonesia; according to the Health and Nutrition National Survey 2013, its prevalence among adults aged 20 years and older was 9.5%.[14]

Table 1: Obesity attributable fraction (OAF) of diseases

Comorbidities	OAF (%)				OAF average (%)	
	BMI 25-30		BMI ≥ 30			
	Male	Female	Male	Female	Male	Female
Colon and colorectal cancer	8.11	10.19	2.32	3.87	5.22	7.03
Pancreas cancer	4.62	5.70	3.12	3.53	3.87	4.62
Breast cancer		1.98		0.79	0.00	1.39
Ovarian cancer		4.34		1.68	0.00	3.01
Endometrial cancer		11.78		11.93	0.00	11.86
Diabetes Mellitus	19.50	42.39	12.55	41.04	16.03	41.72
Hypertension	4.62	14.07	2.06	7.97	3.34	11.02
Ischemic heart disease	4.78	16.78	1.77	11.36	3.28	14.07
Asthma	3.34	5.93	1.06	4.54	2.20	5.24
Stroke	3.83	3.64	1.26	2.90	2.55	3.27

Note: OAF: Obesity attributable fraction; BMI: Body mass index

Table 2: Number of incidence of comorbidities related to obesity

Comorbidities	Number of deaths of comorbidities related to obesity					
	Overweight	Obese		Overweight	Obese	
	Male	Female	Total	Male	Female	Total
Colon and colorectal cancer	856	798	1,654	245	303	548
Pancreas cancer	135	156	291	91	97	188
Breast cancer	0	390	390	0	155	155
Ovarian cancer	0	307	307	0	119	119
Endometrial cancer	0	1,119	1,119	0	1,133	1,133
Diabetes Mellitus	5,217	9,198	14,415	3,358	8,905	12,263
Hypertension	110,675	174,567	285,242	49,270	98.870	148,140
Ischemic heart disease	5,060	7,700	12,760	1,873	5,211	7,084
Asthma	1,039	1,211	2,250	331	928	1,259
Stroke	2,805	1,611	4,415	923	1,283	2,206
Total	**125,788**	**197,057**	**322,845**	**56,090**	**117,005**	**173,095**

Table 3: Years life with disability (YLD) of comorbidities related to obesity

	Years life with disability (YLD)					
Comorbidities	**Overweight**	**Obese**		**Overweight**	**Obese**	
	Male	**Female**	**Total**	**Male**	**Female**	**Total**
Colon and colorectal cancer	2,965	91	3,056	848	35	883
Pancreas cancer	226	16	242	153	10	163
Breast cancer	0	351	351	0	140	140
Ovarian cancer	0	730	730	0	283	283
Endometrial cancer	0	1,989	1,989	0	2,013	2,013
Diabetes Mellitus	32,759	4,144	36,903	21,084	4,012	25,097
Hypertension	604,474	807,781	1,412,256	269,098	457,508	726,606
Ischemic heart disease	29,755	38,464	68,219	11,013	26,033	37,046
Asthma	1,017	1,203	2,219	323	922	1,245
Stroke	32,809	29,445	62,255	10,794	23,462	34,256
Total	**704,005**	**884,215**	**1,588,221**	**313,314**	**514,418**	**827,732**

The burden of cardiovascular diseases is increased by the substantial healthcare costs of these chronic diseases patients. An updated published study evidenced that the annual direct medical costs per patient ranges from US$699 to US$748.[15-17] Direct costs of this chronic disease represent approximately 14% of total health spending.[18] Worldwide, ischemic heart disease, as acute myocardial infarction, is the principal cause of death.[19, 20] However, morbidity and mortality attributable to cardiovascular diseases may be underestimated by the use of different codes of diseases classification in health providers and non-hospitalized patients.

In addition to overweight and obesity, a high prevalence of other known cardiovascular risk factors is tobacco smoking.[12] Another confounder of the association between weight and mortality is smoking status. Because smoking is more prevalent among individuals and is also a strong independent risk factor for morbidity and mortality,[21] adjusting the risk factors effects will produce a concise analysis. In any event, the strongest relationship between weight and morbidity is observed in studies of never smokers; it would therefore be instructive to analyze among this subgroup.

CONCLUSION

The study findings provide quantitative evidence of burden of disease attributable to overweight and obese among Indonesian adult population. Overweight and obese are major risk factors for cardiovascular diseases including hypertension and IHD that are main causes of morbidity in the study population. This study shows the impact of overweight and obesity on the disease burden and highlights the importance of reducing overweight and obesity to prevent the onset, or reduce the severity, of associated diseases in the population. Results from this study suggest that prevention and intervention efforts may best be focused on maintaining a healthy weight in children, as well as reducing existing overweight and obesity in all age groups, for maximum health gains in the future.

REFERENCES

1. Ndumele CE, Matsushita K, Lazo M, Bello N, Blumenthal RS, Gerstenblith G. Obesity and subtypes of incident cardiovascular disease. J Am Heart Assoc 2016;5(1): e003921

2. Muennig P, Lubetkin E, Jia H, Franks P. Gender and the burden of disease attributable to obesity Am J Public Health. 2006;96(9):1662-68.
3. Wang YC, McPherson K, Marsh T, Gortmaker SL, Brown M. Health and economic burden of the projected obesity trends in the USA and the UK. Lancet. 2011;378:815-25.
4. World Health Organization. Global Health Observatory (GHO) Data: Overweight and Obesity by Country Geneva: World Health Organization; 2015 [cited 2016 February 15]; Available from: http://www.who.int/gho/ncd/risk_factors/overweight/en/.
5. WHO. Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013-2020. Geneva: WHO, 2013.
6. Jia H, Lubetkin EI. The statewide burden of obesity, smoking, low income and chronic diseases in the United States. J Pub Health. 2009;31(4):496-505
7. Gortmaker SL, Swinburn B, Levy D, Carter R, Mabry PL, Finegood D, et al. Changing the future of obesity: Science, policy and action. Lancet. 2011;378(9793):838-47.
8. WHO. Global Burden of Disease. Geneva: WHO, 2017.
9. Flegal KM, Panagiotou OA, Graubard BI. Estimating population attributable fractions to quantify the health burden of obesity. Ann Epidemiol. 2015;25:201-7.
10. Roemling C, Matin Q. Obesity trends and determinants in Indonesia. Appetite. 2012;58(3):1005-13.
11. Bogers RP, Bemelmans WJ, Hoogenveen RT, Boshuizen HC, Woodward M, Knekt P. Association of overweight with increased risk of coronary heart disease partly independent of blood pressure and cholesterol levels: a meta-analysis of 21 cohort studies including more than 300 000 persons. Arch Intern Med. 2007;167:1720-8.
12. Bhaskaran K, Douglas I, Forbes H, dos-Santos-Silva I, Leon DA, Smeeth L. Body-mass index and risk of 22 specific cancers: a population-based cohort study of 5.24 million UK adults. Lancet 2014;384:755-65
13. Guh DP, Zhang W, Bansback N, Amarsi Z, L B, Anis AH. The incidence of co-morbidities related to obesity and overweight: A systematic review and meta-analysis. BMC Pub Health. 2009;9(88).
14. Ministry of Health RI. Basic Healt Survey Report 2013. Jakarta: Ministry of Health, 2013.
15. Pitayatienanan P, Butchon R, Yothasamut J, Aekplakorn W, Teerawattananon Y, Suksomboon N, et al. Economic costs of obesity in Thailand: a retrospective cost-of-illness study. BMC Health Serv Res. 2014;14(146):1-8.
16. Rtveladze K, Tim Marsh T, Webber L, Kilpi F, Levy D, McPherson K, et al. Health and economic burden of obesity in Brazil. PLoS ONE. 2013;8(7):e68785.
17. Sander B, Bergemann R. Economic burden of obesity and its complications in Germany. Eur J Health Econ. 2013;4(4):248-53.
18. Hoque ME, Mannan M, Long KZ, Al Mamun A. Economic burden of underweight and overweight among adults in the Asia-Pacific region: a systematic review. Trop Med Intl Health 2016;21(4):458-69.
19. Singh GM, Danaei G, Farzadfar F, Stevens GA, Woodward M, Wormser D. The age-specific quantitative effects of metabolic risk factors on cardiovascular diseases and diabetes: a pooled analysis. PLoS ONE. 2013;8:e65174.
20. Cameron AJ, Magliano DJ, Soderberg S. A systematic review of the impact of including both waist and hip circumference in risk models for cardiovascular diseases, diabetes and mortality. Obesity Rev. 2013;14:86-94.
21. Kristina SA, Endarti D, Prabandari YS, Ahsan A, Thavorncharoensap M. Burden of Cancers Related to Smoking among the Indonesian Population: Premature Mortality Costs and Years of Potential Life Lost. Asian Pac J Cancer Prev. 2015;16(16):6903-08.

Cite this article as:

Susi Ari Kristina *et al*. National estimation of years life with disability (YLD) attributable to overweight and obese among Indonesian adults. Int. Res. J. Pharm. 2019;10(2):81-84 http://dx.doi.org/10.7897/2230-8407.100247

Source of support: Nil, Conflict of interest: None Declared

Disclaimer: IRJP is solely owned by Moksha Publishing House - A non-profit publishing house, dedicated to publish quality research, while every effort has been taken to verify the accuracy of the content published in our Journal. IRJP cannot accept any responsibility or liability for the site content and articles published. The views expressed in articles by our contributing authors are not necessarily those of IRJP editor or editorial board members.