Haemoglobin Level among Overweight and Obese Adult Women

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Introduction

Obesity is frequently related with major non-communicable diseases such as diabetes, hypertension, and cardiovascular diseases etc (Alastair, 2010). Further, obesity has been reported to be associated with low blood haemoglobin, too (Jacques et al. 1990). Measurement of haemoglobin concentration is the most commonly used screening methods for the presence of iron levels. Iron is a nutritionally essential trace clement that is critical for optimal physical and cognitive performance of the human body. However, alterations of iron metabolism can be a cause for low blood haemoglobin in overweight and obese adults. Also, researches revealed that reduced iron intake due to poor dietary choices by overweight individuals may contribute to poor iron status (Aeberli *et al.,* 2006).

The combined burden of non communicable diseases is rapidly increasing in lower-income countries (World Health Organization, 2011) and the percentage of Sri Lankan adults in the overweight, obese and centrally obese categories were 25.2 percent, 9.2 percent and 26.2 percent respectively (Katulanda *et al.,* 2010). Therefore, the increasing amounts of overweight/obesity would potentially increase the burden of low blood haemoglobin in Sri Lanka, too.

Research Problem

To ascertain whether the overweight group women or obese group women increase the burden of low haemoglobin levels.

Objectives of the Study

To investigate the relationship between haemoglobin level in overweight group and obese group of Sri Lankan females.

Methodology

This study was conducted at the Ayurveda Teaching Hospital, Borella, Sri Lanka. The research study was conducted from July 2012 through March 2013 that included a convenience sample of 121. Female adults overweight (BMI between 25 -30 Kg/m^2 and obese (BMI over 30 Kg/m^2) were recruited and inclusion criteria were being in an age group of 18 to 60 years and female. Pregnant women, disabled females and those who were on a special diet for medical reasons were excluded.

The information of age, occupation, educational status and income were taken. Body Mass Index (BMI), blood pressure, pulse, waist and hip measurements, were taken. .The hip measurement was taken to the nearest 0.5 cm (WHO expert consultation Report, 2008). Participants were categorized by weight status according to the cut-off values for BMI proposed by World Health Organization (WHO expert consultation Report, 2004). When BMI (kg/m^2) was used as a categorical variable, subjects were classified as follows: normal weight: 18.5-24.9 kg/m^2; overweight: 25.0-29.9 kg/m^2; or obese $\geq$ 30.0 kg/m^2. Haemoglobin percentage was used as the biochemical variable and it was defined according the cutoff points proposed by WHO (World Health Organization, 2011). The definitions of haemoglobin percentage to the non pregnant women were as follows: 11.0 -11.9 g/dl mild anaemia, 8.0 – 10.9 g/dl moderate anaemia and < 8 g/dl severe anaemia. All statistical analyses were performed using the Statistical Package for the Social Sciences for IBM SPSS version 14.

Key Findings

Table 1: Statistical Means and Standard Deviation of Anthropometric Variables between Overweight and Obese Participants

Overweight/ Obese	BMI (Kg/m^2)	WC	HC	WHR	SBP	DBP	pulse/min	Hb (g/dl)
Overweight (41.3%)	27.85+1.4	97.66 +6.7	101.63+ 4.8	.95+0.04	119.40+ 9	76.4±7	70.7+ 5.5	11.6+ 1.4
Obese (58.7%)	34.93+4.4	109.71 +9.8	114.45+ 9.5	.95+0.06	122.04+ 13	78.9± 10	69.8+5.5	12.1+ 0.9
Total	32.01+4.9	104.73 +10.5	109.15+ 10.1	.95+0.05	120.95+ 12	77.8±9	70.2+5.5	11.8+ 1.2

Notes: BMI-body mass index, DBP-diastolic blood pressure, Hb- haemoglobin percentage, HC-hip circumference, SBP- systolic blood pressure, WC-waist circumference, WHR-waist to hip ratio

Source: Data compiled by author

In this study 41.3 percent and 58.7 percent of the subjects were at risk of overweight and obesity respectively and it is also shown that obese participants were higher than that of overweight participants. The results in Table 1 exposed clearly that the mean concentration of the haemoglobin levels of overweight and obese participants were 11.6 g/dl and 12.1 g/dl, respectively. Among the subjects, 33.3 percent overweight and 14.6 percent of obese participants showed a low haemoglobin level. The results of the Table 2 revealed that the low haemoglobin level (31.2%) was found on the age group 31-40 years with compare to the other age groups. Concurrently, the abnormally highest mean of waist circumferences 105.4 ± 11.7cm and the highest mean of waist to hip ratio 0.97 ±0.05also found within the same age group. The waist circumferences 105.4 ± 11.7cm and the waist to hip ratio 0.97 ±0.05was far above the cut off points mentioned in the World Health Organization (Report of a WHO expert consultation, 2008). Study revealed that the variables SBP and DBP were not showed difference from the normal and low Hb level group participants as the mean of the SBP and DBP were within the normal range in both groups.

Table 2: Prevalence of Haemoglobin Percentage with Socio - Demographic Variables

Variables	Haemoglobin Percentage	
Age in Groups	Normal Hb level (52.1%)	low Hb leve (47.9%)
18 -30	10.4%	4.2%
31 -40	18.8%	31.2%
41 – 60	22.9%	12.5%
Level of Education		
Grade 1 - 10	6.3%	10.4%
Complete O/L	22.9%	12.5%
Complete A/L	16.6%	18.7%
Degree or Above	6.3%	6.3%
Employment Status		
House Wife	33.3%	39.5%
Office Employee	12.5%	6.3%
Student	6.3%	2.1%
Marital Status		

Single	12.5%	0
Married	39. 6%	47.9%
Total Number of Person Living in the House		
1- 4 members	37.5%	25%
5 - 6 members	12.5%	22.9%
7 or more members	2.1%	
Family Income		
less than 25000	16.7%	10.4%
26000 to 50000	20.8%	16.7%
51000 to 75000	6.3%	8.3%
Above 76000	8.3%	12.5%

Source: Data compiled by author

Further, Table 2 illustrates the variation of haemoglobin percentage with socio - demographic variables. In the present study as whole 47.9 percent of the subjects showed low heamoglobin level. Demographic factors indicate that low haemoglobin level was most prevalent among 31-40 year-old subjects (31.2%), followed by 41-60 year-old subjects (12.5 %) and then 18-30 year-old subjects (4.2%). When employment status is considered, it was found that low haemoglobin level was highest in house wives (39.5%) than that of the office employee and the students in the study group. Considering the marital status 47.9 percent of the married participants showed a low haemoglobim level. The results showed that about 37.5 percent of subjects were with normal haemoglobin and 27.1 percent of the subjects were with low haemoglobin level who received a monthly income of less than Rs. 50,000. However, 20.8 percent of the women who earned a monthly income above Rs. 50,000/- also showed a low haemoglobin level.

Analysis was done to find correlation between BMI, WC, HC, WHR, SBP, DBP, pulse and blood Hb% separately. The hip circumference (.292) and DBP (.317) showed a significant relationship with blood Hb% at $p < 0.01$. The BMI (.214), WC (.213), SBP (.167) were shown a weak but positive relationship with blood Hb%.

Conclusion

In this study, overweight women had an increased prevalence of low haemoglobin levels than obese women. Specifically, 31-40 year age group was affected more by a low haemoglobin level than the other age groups. Also in the same age group, the highest mean values were found in WC and WHR

and it was abnormally higher than the cutoff points mentioned by WHO. Low education level influenced a low haemoglobin level and high income in families also impacted low a haemoglobin levels in overweight /obese women.

Given the increasing numbers of overweight women and the known morbidities of low haemoglobin levels, these findings suggest that a plan for screening may need to be implemented for the reproductive age group to minimize the ill effects on them and their children. Also, it is suggested that the population should be educated to consume iron-rich foods and leaves in their daily diet as our ancestors did.

Acknowledgement

Key words: Adult Women; Body Mass Index; Haemoglobin Level; Hi Ratio; Overweight;

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