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**The Pursuit of Thinness – An outcome study of Anorexia Nervosa**

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## The Pursuit of Thinness – An outcome study of Anorexia Nervosa

## **ABSTRACT**

**Introduction:** As in many western countries, Anorexia Nervosa (AN) is a growing problem among young female Singaporeans. We studied the demographics and follow-up data of AN patients referred to NUH dietitians for nutritional intervention.

**Methods:** A retrospective nutritional notes review was done on 94 patients seen from 1992 to 2004. All patients were given nutritional intervention, which include individualised counselling for weight gain, personalized diet plan, correction of poor dietary intake and correction of perception towards healthy eating. We collected data on Body Mass Index (BMI), patient demographics and outcome.

**Results:** 96 percent of the patients were female and 86.2 percent were Chinese. The median BMI at initial consultation was 14.7 kg/m<sup>2</sup> (range: 8.6-18.8 kg/m<sup>2</sup>). Seventy-six percent were between 13 and 20 years old. 83 percent of the patients came back for follow-up appointments with the dietitians in addition to consultation with the psychiatrist. Overall, there was significant improvement in weight and BMI from average 37 kg to 41kg and 14.7 kg/m<sup>2</sup> to 16.4 kg/m<sup>2</sup> between the first and final consultation (p<0.001). The average duration of follow-up was about 8 months. Among the patients on follow-up, 68 percent showed improvement with an average weight gain of six kg. Patients that improved had more outpatient follow-ups with the dietitians (4.2 consultations vs 1.6 consultations; p<0.05), lower BMI at presentation (14.2 kg/m<sup>2</sup> vs 15.7 kg/m<sup>2</sup>; p<0.01) and shorter duration of disease at presentation (1 year vs 3 years; p<0.05) compared with those who did not improve. Seven patients with disease for more than 2 years did not show improvement with follow-up.

**Conclusion:** We gained valuable understanding of the AN patients referred to our tertiary hospital for treatment - 2/3 of whom improved with adequate follow-up

treatment. Patients that had suffered AN longer before seeking help appeared more resistant to improvement.

**Keywords:** Anorexia Nervosa, eating disorders, body mass index, outcome study, weight gain

## **INTRODUCTION**

Anorexia Nervosa (AN) is characterized by an intense fear of gaining weight coupled with significant disturbance in perception of body size or shape. This affects the ability to maintain a minimally normal body weight. Multiple and grave physical complications accompany AN. These complications include and are not limited to psychiatric disorders<sup>(1,2)</sup>, amenorrhoea, osteoporosis or osteopenia leading to stress fractures and vertebra compressions<sup>(3,4)</sup>, gastrointestinal complications<sup>(5)</sup> e.g. delayed gastric emptying, dilation of the gastric and small intestine and cardiac complications which have been associated with death in AN patients<sup>(2)</sup> e.g. bradycardia, hypotension, reduced heart mass and electrocardiogram (ECG) abnormalities.

Treatment of AN is challenging and involves an interdisciplinary team approach<sup>(1,6,7)</sup>. Psychotherapy and nutrition therapy are integral in the treatment of AN<sup>(2,5)</sup>.

A recent review revealed that prevalence rates in non-western countries are comparable to western counterparts<sup>(8)</sup>. Current estimates of prevalence amongst adolescents and young women in western countries indicate that 0.5 to 1% suffer from AN<sup>(9)</sup>. In Singapore, some data of AN patient demographics and characteristics exist<sup>(10,11,12,13)</sup> though there is no data on the outcome of patient treatment. We therefore retrospectively examined the nutritional notes of 94 AN patients seen by dietitians at the National University Hospital (NUH) from 1992 to 2004. We studied the association between weight improvement and the number of follow-up treatments, duration of disease and BMI at presentation.

## **METHODS**

The nutritional notes of 94 patients seen by dietitians at the National University Hospital for AN between 1992 and 2004 were examined retrospectively. Of the 94 patients, 49 patients were seen as inpatients (hospital admissions) at the first dietetic consult while thirty-four patients were seen only as outpatients. The remaining eleven patients had been seen as outpatients at the first dietetic consult but as inpatients in subsequent follow-ups (hospital admissions).

The data collected included: weight and BMI at initial and final consultations, patient demographics including occupation, duration of disease since onset and outcome after follow-up consultations.

Patients diagnosed with Bulimia Nervosa (BN) and Eating Disorders Not Otherwise Specified (EDNOS) were excluded from the study as the nutritional and medical therapy as well as complications of BN and EDNOS differ significantly from AN<sup>(2,6,14,15)</sup>.

Patients were diagnosed with AN by attending psychiatrists using the American Psychiatric Association's (APA) criteria, *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed. (DSM-IV)<sup>(16)</sup>.

Consulting dietitians utilized standard protocols of care for eating disorders developed by the dietetics department of NUH. At the first dietetic consultation, medical history including symptoms, duration of disease since onset, duration of amenorrhoea and possible triggers of the disease were obtained. Height and weight of patients were taken weekly or at each consultation if the duration from last consults was more than a week. Calibrated hospital stadiometers were used. For patients under eighteen years of age, height for age and weight for height were plotted on local percentile charts<sup>(17)</sup>. Diet history was taken and individualized counselling included

goals for weight gain, strategies to meet goals, correction of poor dietary intake, correction of perception towards healthy eating and discussion on the importance of attending follow-up sessions. The dietitian also provided patients with a personalized diet plan. A food chart was commenced if the patient had been hospitalized. During follow-up sessions patient's progress was monitored, goals and strategies previously agreed upon were reviewed. Cognitive behavioral therapy (CBT) and motivational interviewing techniques, incorporated in the protocol, were employed during all dietetic sessions.

Follow-up treatments ended either when patients, on their own accord, ceased attending sessions or when the attending health professional (dietitians or psychiatrists) assessed patients' health status as acceptable and have recovered from AN. Patients were classified as having made an improvement if they experienced a weight gain of  $\geq 0.5\text{kg}$ .

All 94 AN patients had their demographics tabulated. Body mass index (BMI) was calculated for all 94 patients and for purposes of statistical analyses used as variable to determine overall average improvement. From the 94 patients, 78 (83%) patients came back for follow-up appointments with the psychiatrists and dietitians.

Statistical analyses were carried out using SPSS for Windows version 11.0 (Chicago, IL, USA). Test for normality on weight and BMI showed that the data was parametric. Two tailed paired *t* test was therefore used to compare weight and BMI of AN patients ( $n = 78$ ) after follow-up treatments. Mann-Whitney U test was used to compare patients who improved and those who did not show improvement in terms of age, duration of onset, BMI at presentation, difference in weight (initial and final consults), number of outpatient treatments and total number of follow-up treatments. These parameters were non-parametric.



## **RESULTS**

Of the 94 AN patients seen by dietitians at NUH, 90 (95.7%) were females while four were males.

The population of Singapore<sup>(18)</sup> is made up of 76.8% Chinese, 13.9% Malay, 7.9% Indian and 1.4% others. In our study, Chinese accounted for 86.2% of patients, followed by Malays (6.4%), Indians (5.3%) and others (2%). The Malay and Indian population in our sample may be under-represented.

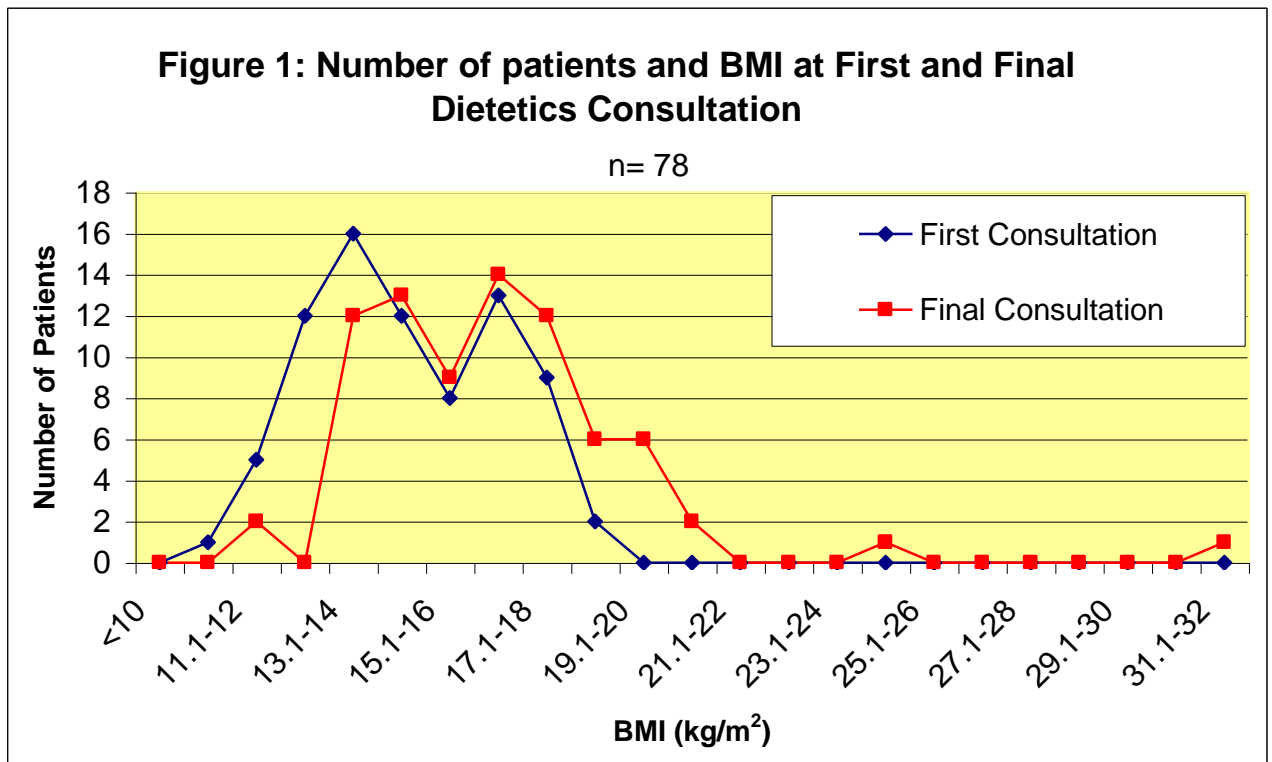
Age distribution was skewed towards the younger ages, with median age being sixteen years old ( $SD\pm 7.6$ ). 71 (76%) AN patients were aged between thirteen and twenty years old. The youngest patient seen was ten years old while the oldest patient was 70.

The occupation of patients is summarized in Table I. Professions of those working include: teaching background (3), model (2), bank clerk (1), engineer (1), executive (1), librarian (1) and translator (1). The occupation of one patient was unavailable.

78 (83%) patients returned for follow-up treatments. The average duration of dietetic follow-up ( $n = 78$ ) was eight months ( $SD\pm 11.3$ ). Of this, 53 (68%) patients showed an improvement, 23 AN patients were classified as having made no improvement while 2 patients were subsequently diagnosed with BN and binge-eating respectively by psychiatrists (refer to discussion). No deaths were reported in patients who returned for follow-up treatments during this twelve-year period.

**Table I: Occupation of patients**

Occupation	Number	Percentage
Student	78	83%
Professionals	10	11%
Unemployed	3	3%
Retired	1	1%
Housewives	1	1%
Not known	1	1%



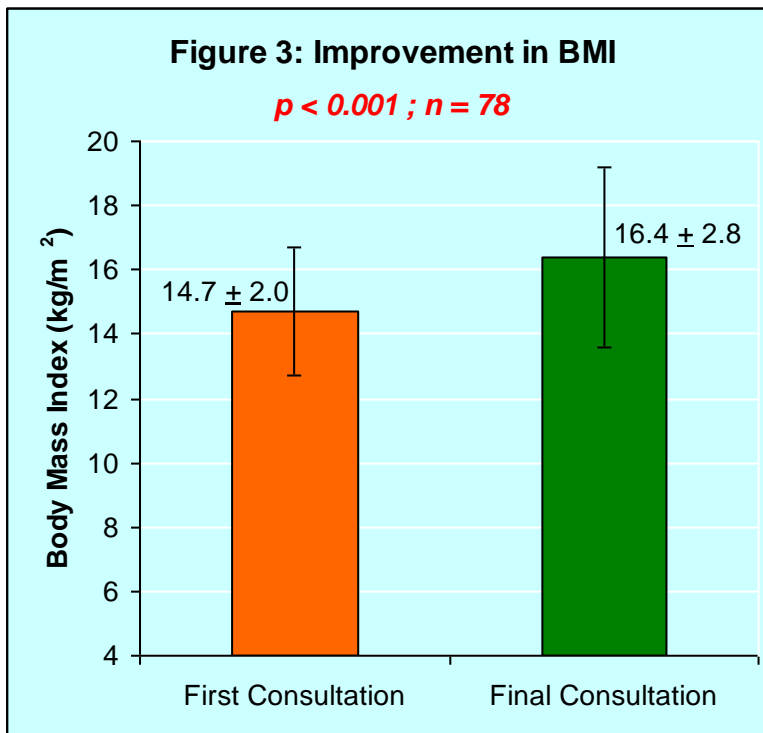
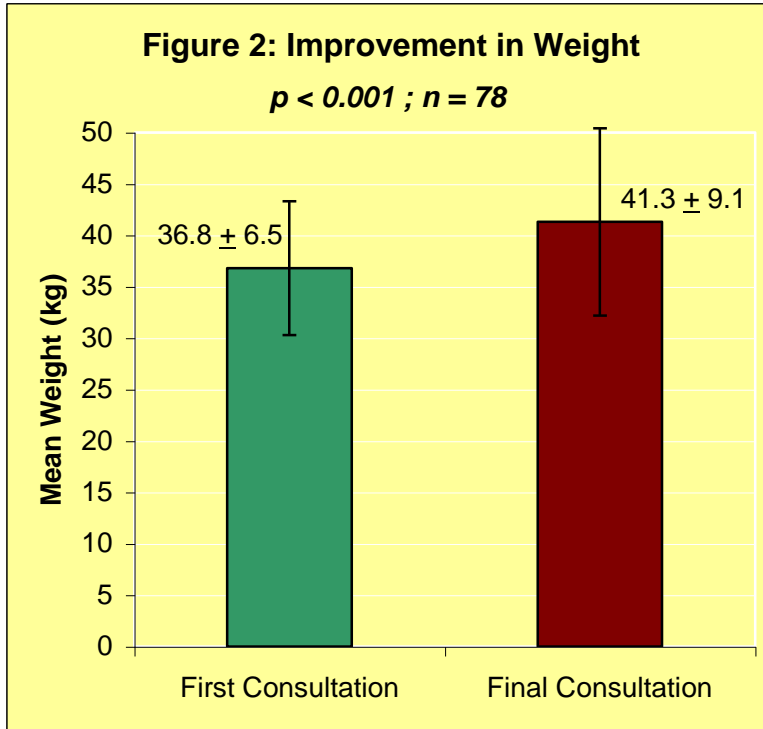


Figure 1 presents BMI distribution of patients at first and final dietetic follow-up. At first consultation, BMI of the 94 AN patients ranged from 8.6 to 18.8 kg/m<sup>2</sup>. Median BMI was 14.7 kg/m<sup>2</sup> (SD±2.1). 57 (61%) AN patients fell within the BMI ranges of 13.1 to 17 kg/m<sup>2</sup>. BMI for six patients was marginal which does not fall into the criteria for diagnosis as AN<sup>(16)</sup>. At first consultation with us, BMI of these six patients ranged from 18.06 kg/m<sup>2</sup> to 18.81 kg/m<sup>2</sup>; mean 18.37 kg/m<sup>2</sup> (SD±0.3). As the duration of onset at presentation for these patients (n = 6) ranged from four months to seven years; mean 25.7 months (SD±33.2), the BMI of these six patients were not their lowest at the first consultation with us.

Overall, there was significant weight improvement in patients who attended follow-up sessions from an average of 36.8±6.5 kg to 41.3±9.1 kg, p < 0.001 (Figure 2) and BMI, 14.7±2.0 kg/m<sup>2</sup> to 16.4±2.8 kg/m<sup>2</sup>, p < 0.001 (Figure 3).

**Table II: Analyses on AN patients who improved and those who did not improve after dietetic follow-up.**

Variable	Patients who improved (n =53)	Patients who did not improve (n =23)	p value
Age ( <i>years</i> )	16.9 ± 5.0	20.4 ± 13.1	0.601 (NS)
Total dietetic follow-up (inpatient & outpatient)	8.9 ± 8.9	5.4 ± 5.6	0.03*
Number of outpatient consultations with dietitian	4.2 ± 5.3	1.6 ± 2.6	0.02*
Number of inpatient consultations with dietitian	4.7 ± 6.8	5.2 ± 8.3	0.78 (NS)
BMI at presentation ( <i>kg/m<sup>2</sup></i> )	14.2 ± 1.9	15.7 ± 1.7	0.002*
Weight Gain ( <i>kg</i> )	6.0 ± 5.9	-1.8 ± 2.0	< 0.001*
Duration of AN at presentation ( <i>years</i> )	1.0 ± 1.2	3.1 ± 5.3	0.016*

± indicates standard deviation. NS denotes not significant. \* denotes p value is significant. Patients subsequently diagnosed with BN (n=1) and binge-eating (n=1) were excluded from statistical analyses, as they were part of the exclusion criteria for this study.

## **DISCUSSION**

AN commonly affects adolescents and young adults<sup>(5,9)</sup>. Our findings were similar with the eight-year retrospective study of AN in Singapore<sup>(11)</sup>. Lee et al<sup>(11)</sup>, documented that the mean presenting age of their sample was 17.6 years and 73.8% of their sample were students. In our study, the median age was 16 years old while 83% were students. Earlier-onset (seven to 12 yrs) and later-onset of AN do occur. Eight patients in this study were 12 years old or younger. Levey et al<sup>(5)</sup> associated earlier onset of AN with obsessional behavior and depression. The oldest patient was a 70 year-old who had co-morbid psychiatric diagnoses of hypochondriasis and depression. Aetiology of AN in the elderly is limited. Hill et al<sup>(19)</sup> reported AN in a 72 year woman following bereavement of her husband.

Medical nutrition therapy using CBT and motivational interviewing techniques resulted in 68% (n =53) of patients in our study improving in terms of weight. Experienced dietitians attend to patients with eating disorders at NUH. Dietitians challenged patients with accurate information on dieting, nutrition and the relationship between their physical symptoms and AN. Patients were asked to identify foods they liked and disliked and dietitians assisted in dispelling myths and rationalizing with patients the importance of including certain foods in their diet. Where appropriate, patients were asked to record the advantages and disadvantages of having the disease as motivation to improve on their condition. All patients were given individualized meal plans, which provided portion sizes as well as a checklist indicating food consumption. In cases where patients were twelve years old and younger, parents were requested to assist patients to complete the checklist.

Treatment outcomes in other long term follow-up studies of AN reveal differing results. Zipfel et al<sup>(20)</sup>, in a 21 year follow-up study, found that 50.6% of AN patients fully recovered, 10.4% still met diagnostic criteria for AN and 15.6% died. Eckert et al<sup>(21)</sup>, in a ten-year follow-up of AN recorded only 23.7% of patients fully recovered with crude mortality rate being 6.6%. Steinhausen et al<sup>(22)</sup> showed more promising results with 80.3% of patients recovering, however mortality rate was 8.3%.

29% (n =23) of patients did not show any improvement i.e. remained at previous weight or suffered more weight loss. One patient was subsequently diagnosed with bulimia and another with binge-eating. The BMIs of these patients are reflected in Figure 1, which shows two outliers, one at BMI 24.5 (acceptable)<sup>(23)</sup> and another at BMI 31.4 (obese)<sup>(23)</sup>. The first patient defaulted outpatient follow-up after receiving dietetic intervention on three occasions within a year. Three and a half years later, she was referred again to outpatient dietetics by psychiatry for BN. On the other hand, the second patient had two hospital admissions for AN. Her weight improved during the second admission. Six months after discharge, she was documented to be binge eating and consequently experienced a weight gain of 10 kilograms in two months. Both cases had different presentations. These two patients were excluded from statistical analyses (Table II), as they were part of the exclusion criteria for this study. Following criteria of improvement, these patients would have been classified as patients who improved, therefore strengthening the results of statistical analyses obtained. Eckert et al<sup>(21)</sup>, revealed 32.5% of anorexics developed binge-eating after index hospitalization while Fitcher et al<sup>(24)</sup> recorded 16.8% of anorexics developed BN.

No deaths were reported among our patients who received follow-up treatments (n =78). This is not representative of the population (n=94) as no attempt was made to contact patients who did not attend follow-up. It is important to highlight that AN has one of the highest mortality rates of all psychiatric disorders<sup>(21)</sup>. A review<sup>(25)</sup> of 119 study series of AN, revealed a mean crude mortality rate of 5%.

We also investigated the association of determined variables with outcome (Table II). In this study, age of disease onset was not associated with outcome. However, there is conflicting evidence in this area. Steinhausen's review<sup>(25)</sup> suggests younger age at onset is associated with favourable outcome while Zipfel et al<sup>(20)</sup> reveals that age at onset was not associated with an increased risk for chronic course of AN.

The average duration of dietetic follow-up (n =78) was eight months. Total dietetic follow-up (inpatient & outpatient) as well as outpatient follow-ups alone was associated with better outcome. Patients who improved received more follow-up treatments than patients who did not improve, 8.9 sessions (SD±8.9) versus 5.4 sessions (SD±5.6),  $p < 0.05$ . Literature in this area is limited. However, it has been observed that longer duration in between follow-up treatments is associated with better outcome<sup>(24)</sup>. One of the possible reasons why those who improved had more follow-up consultations was because they were more severely afflicted (had lower BMI), and therefore the dietitian and psychiatrist saw a need for more vigorous follow-ups.

Patients who improved had a lower BMI at presentation,  $14.2 \text{ kg/m}^2 \pm 1.9$  than patients who did not improve,  $15.7 \text{ kg/m}^2 \pm 1.7$ ,  $p < 0.01$ . Patients who improved gained  $6.0 \pm 5.9$  kilograms while those who did not improve loss  $1.8 \pm 2.0$  kilograms ( $p < 0.001$ ). Again there is conflicting evidence, Zipfel et al<sup>(20)</sup> showed that a low BMI



was associated with poorer outcome while Fitcher et al<sup>(24)</sup> observed that amount of weight gain or loss was predictive of long term outcome.

Patients who improved had a shorter duration of disease onset,  $1.0 \pm 1.2$  years compared to those who did not improve,  $3.1 \pm 5.3$  years ( $p < 0.05$ ). This finding is consistent with several studies, which have established that a longer duration of disease onset is associated with poor outcome<sup>(20,21,24)</sup>.

Our study does have limitations. Local growth charts for children<sup>(17)</sup> are able to determine ideal height for age and ideal weight for height but not BMI percentiles. We were therefore confined to using actual BMI for all patients including those under eighteen to standardize the parameters for analyses. Selection bias exists as the study group was entirely from a pool of patients seen at NUH and therefore may not be representative of the true population. Data was collected from patients seen way back in year 1992 till 2004. Hence treatment environment and lifestyle of patients that may differ were not addressed besides the management of patients, which might not be from the same clinicians and dietitians. As this is a retrospective study, there are some other outcome measures that could have been taken into consideration but were not due to the availability of data such as behavioural outcomes and restoration of menstrual cycle. Nevertheless weight gain and BMI that have been included are part of recognized outcome measures<sup>(24)</sup>. Our study was observational in nature and the data is extracted from the nutritional notes. We cannot completely exclude the possibility that associations established could be due to factors that have not been investigated.

Findings in this study emphasize the importance of early identification and treatment of AN. A proportion of patients do not seem to benefit from professional intervention, suggesting a prevention program targeted at the public may be useful. It

is recommended that a study into the need for a public prevention program be undertaken.

In conclusion, a good percentage of AN patients who attended follow-up treatment improved while a small percentage did not. Some patients were also vulnerable to binge eating during treatment. Patients who suffered AN longer before seeking help appeared more resistant to improvement.

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## REFERENCES

1. American Psychiatric Association. Practice Guidelines for the Treatment of patients with Eating Disorders. *Am J Psych* 2000; suppl 157: 1-39.
2. Position of the American Dietetic Association: Nutrition Intervention in the Treatment of Anorexia Nervosa, Bulimia Nervosa, and Eating Disorders Not Otherwise Specified (EDNOS). *J American Dietetic Ass* 2001; 101:810-21.
3. Bachrach L K, Guido D, Datzman, et al. Decreased bone density in adolescent girls with Anorexia Nervosa. *Pediatrics* 1990; 86:440-7.
4. Biller B M K, Saxe V, Herzog D B, et al. Mechanisms of osteoporosis in adult and adolescent women with Anorexia Nervosa. *J Clin Endocrinol Metab* 1989; 68: 548-54.
5. Levey R, Williams-Wilson B, Curfman C W. Anorexia Nervosa. Available at: [www.emedicine.com/med/topic144.htm](http://www.emedicine.com/med/topic144.htm) Accessed November 5, 2005.
6. Kreipe R E, Uphoff M. Treatment and Outcome of Adolescents with Anorexia Nervosa. *Adolescent Med* 1992; 16: 519-40.
7. Steiner H, Mazer C, Litt I F. Compliance and outcome in Anorexia Nervosa. *West J Med* 1990; 153:133-9.
8. Key A, Lacey H. Progress in Eating Disorder Research. *Curr Opin Psychiatry* 2002; 15:143-8.
9. Ung E K. Eating Disorders in Singapore: A Review. *Ann Acad Med S'pore* 2003; 32: 19-24.
10. Ong Y L, Tsoi W F, Cheah J S. A clinical and psychosocial study of seven cases of anorexia nervosa in Singapore. *S'pore Med J* 1982; 23:255-61.
11. Lee H Y, Lee E L, Pathy P, et al. Anorexia Nervosa in Singapore: an eight-year retrospective study. *S'pore Med J* 2005; 46:275-81.

12. Kua E H, Lee S C, Chee K T. Bulimia Nervosa. S'pore Med J 1982; 23:287-9.
13. Ung E K, Lee D S-W. Anorexia nervosa and bulimia – A Singapore perspective. S'pore Med J 1997; 38:332-5.
14. Rock C L. Nutritional and Medical Assessment and Management of Eating Disorders. Nutr Clin Care 1999; 2:332-43.
15. Halmi K A. Treatment of Anorexia Nervosa: a discussion. J Adolesc Health Care 1983; 4: 47-50.
16. American Psychiatric Association (APA). Diagnostic and statistical manual for mental disorders (4<sup>th</sup> Ed.). Washington DC: APA, 1994.
17. Lyen K R, Lee W K, Lam S L, et al. Growth Charts. S'pore:Dumex, 1988.
18. Key Indicators of The Resident Population. Available at:  
[www.singstat.gov.sg/keystats/c2000/indicators.pdf](http://www.singstat.gov.sg/keystats/c2000/indicators.pdf) Accessed October 5,2005.
19. Hill R, Haslett C, Kumar S. Anorexia nervosa in an elderly woman. Australian and New Zealand Journal of Psychiatry 2001; 35: 246-8.
20. Zipfel S, Lowe B, Reas D L, et al. Long-term prognosis in anorexia nervosa: lessons from a 21-year follow-up study (brief article). The Lancet 2000; 355:721-6.
21. Eckert E D, Halmi K A, Marchi R, et al. Ten-Year Follow-Up of Anorexia Nervosa: Clinical Course and Outcome. Psychological Medicine 1995; 25:143-156.
22. Steinhausen H C, Seidel R, Winkler-Metzke C. Evaluation of treatment and intermediate and long-term outcome of adolescent eating disorders. Psychological Medicine 2000; 30:1089-1098.
23. MOH Clinical Practice Guidelines 5/2004. Obesity. S'pore: Ministry of Health, 2004.

24. Fichter M M, Quadflieg N. Six-Year Course and Outcome of Anorexia Nervosa. *Int J Eating Disorders* 1999; 26: 359-85.
25. Steinhausen H C. The Outcome of Anorexia Nervosa in the 20<sup>th</sup> Century. *American Journal of Psychiatry* 2002;159:1284-1293.