The Acne Problem amongst the Youth in Hong Kong and its Dietary Relationship from a Traditional Chinese Medicine Perspective

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Abstract (English)

Abstract of thesis entitled:

The Acne Problem amongst the Youth in Hong Kong and Its Dietary Relationship from a Traditional Chinese Medicine Perspective

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Background

Although epidemiological studies have showed the high prevalence of acne and its negative effects on mental health, local data has been lacking. The time-honoured traditional Chinese Medicine (TCM) theory has long been acknowledging the diet-acne connection, but no study has evaluated such association. The question of the relevance of diet in acne has remained unanswered in an evidence-based manner.

Objectives

To explore the prevalence of acne vulgaris, the effects on quality of life

(QOL) and its predicitive factors with well-validated measurements including Global Acne Grading System (GAGS) and Cardiff Acne Disability Index (CADI), and the diet-acne association amongst the Chinese youth with a TCM approach in two cross-sectional studies; and to further examine the causal association by evaluating the effectiveness of TCM-syndrome-tailored dietary advice for adolescents in a randomised controlled study.

Methodology

This research was composed of three major parts: (1) a cross-sectional study investigating the prevalence of acne and the acne disability amongst adolescents and young adults from August 2006 to March 2008 in Hong Kong; (2) a cross sectional study investigate the diet-acne connection from a TCM perspective performed amongst young adults in August 2006; and (3) a randomised controlled trial on the effectivenss of TCM-syndrome-tailored dietary advice for adolescents implemented between November 2007 and March 2008 in Hong Kong.

In (1), 1068 Chinese subjects were sampled from the general health evaluation and eight governmental secondary schools in Hong Kong were assessed for their clinical severity of acne using the. Those diagnosed with GAGS score 14 or more were also assessed for the acne-effected QOL with Cantonese version of CADI, of which the translation from English to Cantonese had formally been executed to produce a valid and reliable tool

suitable for use. Prevalence estimates and odds ratios with 95% CI were calculated. Multivariate logistic regression for predictive analysis was performed.

In (2), 322 university entrants completed a dietary questionnaire capturing 11 categories of food intake and were examined for body constitutions of yin-predominance or yang-predominance with a published TCM diagnostic assessment procedure/method. Multivariate logistic models were applied for all participants and for each body constitution group to test the independent association of foods with the occurrence of clinical acne (i.e. GAGS $\geq$4), adjusted for severity of acne, such as gender, age, body mass index, medication history (including oral contraceptives) for the six months preceding the study, tobacco and alcohol habits, sleeping quantity and quality, psychological or emotional problems, and perceived stress.

In (3), 233 students with clinical acne as assessed by GAGS were diagnosed for his or her TCM syndrome subtype, namely wind-heat subtype, damp-heat subtype, stagnant blood or phlegm subtype, and imbalance of chong-ren subtype. They were then randomly assigned to either intervention group (IG) or control group (CG). There were respectively 60 students belonged to each of the wind-heat, damp-heat, and stagnant blood or phelgm subtypes, and 53 students belonged to imbalanced of chong-ren subtype. With the use of a computer generated randomisation list using blocks of six, 30 (50%) students were assigned to either IG or CG for wind-heat, damp-heat, and stagnant blood or phelgm subtypes accordingly, whilst 26 (49%) and 27 (51%) students were assigned to either IG or CG for

imbalance of chongren subtype. TCM-syndrome-tailored diet advice plus standard medical advice were given to IG, whilst standard medical advice alone was given to CG over 12-week study period. The primary analysis was to compare the percentage change of GAGS from baseline to 12 weeks between the groups using univariate analysis for each TCM syndrome, controlling for the variation in the dependent variables due to gender, age, BMI, schools, physical exercise, and female contraceptive use.

Results

In (1), over 93% of the subjects had a certain degree of acne and the prevalence of clinical acne was of 40.4% and coexisted with a high frequency of acne disability. Assessment of the clinical severity of acne did not correlate strongly with the effect on QOL (γs= 0.445, $P < 0.001$). Multivariate logistic regression showed that female gender ($P = 0.002$), higher GAGS score ($P < 0.001$), higher perceived stress ($P = 0.01$) and willingness to pay Hong Kong $15,000 for a hypothetical permanent cure ($P = 0.03$) were positive predictors for acne disability.

As for the investigation of diet-acne association in (2), there were 155 (48.1%) participants in the yin-predominant group and 167 (51.9%) in the yang-predominant group. No association of diet and acne was found when the participants were considered as a whole group. In yin-predominant group, intake of foods from street stalls ($P = 0.04$) was significantly associated with a lower likelihood of acne occurence. In yang-PG, the intake

of desserts (P = 0.04) and fresh fruit juices (P = 0.02) was significantly associated with a higher likelihood of acne occurence, whereas the intake of dairy and soy products (P = 0.04) was significantly associated with a lower likelihood of acne occurence.

In (3), within the imbalance of chong-ren subtype, there was a significant reduction of acne severity in IG compared with that in CG (-11.8% vs 2.1%; p=0.046), after adjusting for gender, age, body mass index, schools, physical exercise, and female contraceptive use. In the other three subtypes, there were no significant differences of acne severity between IG and CG.

Conclusion

Acne is prevalent amongst youth in Hong Kong and has considerable psychological effects. The application of a TCM approach led to the detection of significant associations between diet and the occurence of acne. TCM-syndrome-tailored dietary manipulation was effective in reducing the clinical severity of acne for patients with imbalance of chong-ren subtype.

中文摘要

香港青年人暗瘡問題以及由中醫角度探討暗瘡與飲食之關係

暗瘡是一種非常普遍的皮膚問題，可惜現時亞洲地區欠缺有關暗瘡流行率以及其爲患者帶來的心理影響之數據。另外，近年來有不少學者探討暗瘡與飲食之間的聯系性，而中醫學亦一向重視它們之間的關係。故此，本論文將會運用兩個有效的測量方法 Global Acne Grading System (GAGS) 及 Cardiff Acne Disability Index (CADI) 描述華裔年青人群中暗瘡流行率、暗瘡對患者生活質素帶來的影響及其預測因素、及以中醫學方法探討暗瘡與飲食的關聯；與及進一步研究根據中醫証型分類擬定飲食建議以治療暗瘡之有效性。本研究以橫斷面研究及隨機臨床對照研究探討以上課題。

第一個研究爲橫斷面研究，於二零零六年八月份至二零零八年三月份於香港進行。研究人員利用 GAGS 爲 1068 名青少年人評估其暗瘡臨床嚴重程度，亦會運用廣東版 Cardiff Acne Disability Index 評估暗瘡給他們帶來的影響，以及其他問卷調查有關預測因素。Prevalence estimates、odd ratios 值及其 95%的可信限(CI)會被計算，並會運用 Multivariate logistic regression 擬合進行預測因素分析。

第二個研究亦是橫斷面研究，於二零零六年八月份進行，322 名同時參與在第一個橫斷面研究中青年人名學生完成了一份涵蓋了十一種飲食類型的問卷，研究人員並且利用刊登的中醫學評估方法診斷學生爲屬陰或屬陽的體質。Multivariate logistic model 會分別運用於所有學

生、只診斷爲屬陰的學生及只診斷爲屬陽的學生，以探討飲食與臨床暗瘡(GAGS≥4)的關聯性，並對可能的混雜因素進行控制。

第三個研究爲隨機臨床對照研究，於二零零七年十一月至二零零八年三月間於香港八間中學中進行。經中醫四診合參，233 名被診斷患有臨床暗瘡(GAGS≥4)的學生首先會被診斷爲屬中醫學暗瘡証型分類中的其中一証型：風熱証、濕熱証、痰凝或血瘀証、或沖任失調証。屬同一証型的學生會被隨機分配至治療組或對照組。在屬於風熱証、濕熱証及痰凝或血瘀証的學生中，30(50%)名學生被分配到治療組，30(50%)名學生被分配到對照組；在屬於沖任失調証的學生中，26(49%)名學生被分配到治療組，27(51%)名學生被分配到對照組。治療組會接受根據中醫証型分類擬定飲食建議及常規醫療建議，對照組則只會接受常規醫療建議。整個隨機臨床對照研究爲期十二週。主要分析爲運用 Univariate analysis 比較治療組與對照組之間 GAGS 由基線到第十二週的百分比改變，並對可能的混雜因素進行控制。

結果

在橫斷面研究中發現，93.2%青少年人患有一定程度的暗瘡, 40.4%達到臨床暗瘡的程度。暗瘡同時爲患者帶來生活質素的影響。暗瘡的臨床嚴重程度與其對生活質素的影響沒有很大的關聯性(γ_s= 0.445, $P < 0.001$)。Multivariate logistic regression 分析顯示女性($P = 0.002$)，高 GAGS 分數($P < 0.001$)，自我感知壓力大($P = 0.01$)，願意花費港幣$15,000 購買一假設性能夠永久根治暗瘡的產品($P = 0.03$)是生活質素被暗瘡影響的

正面預測因素。在有關暗瘡與食物關係的分析中，155 (48.1%)學生被診斷爲屬陰的學生，167 (51.9%)學生被診斷爲屬陽的學生。當所有學生被視爲同質的人群，沒有任何一種食物與暗瘡有顯著關聯性。在屬陰的學生中，“點心、魚旦、釀青椒等街頭小食” (P = 0.04)與較低暗瘡的發生率有顯著關聯性。在屬陽的學生中，“甜品、雪糕、蛋糕、西餅或撻” (P = 0.04)和“100%純果汁” (P = 0.02)與較高暗瘡的發生率有關；“奶類飲品及豆品製類” (P = 0.04)則與較低暗瘡的發生率有關。

在隨機臨床對照研究中發現，在屬於沖任失調証的學生中，治療組的暗瘡嚴重程度在接受十二週的飲食建議後，在控制了性別，年齡，BMI，所屬學校，體育活動，及避孕藥使用後的混雜因素影響後，與對照組相比有顯著的減少 (-11.8% vs 2.1%; p=0.046)。

結論

暗瘡在香港很普遍，並且爲患者帶來重要的心理影響。應用中醫方法可以更深入了解暗瘡與食物之間的顯著關係，而根據中醫証型分類擬定飲食建議能夠有效爲沖任失調的暗瘡患者改善暗瘡的嚴重程度。

Acknowledgements

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Mrs Sandra Wu deserves special tribute for her professional assistance and kind support in the data collection process.

Special thanks are due to my colleagues and friends who have been helping and supporting me all along.

This thesis is dedicated to my family, particularly my parents.

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List of Abbreviations

ANOVA	Analysis of variance
BDD	Body dysmorphic disorder
CADI	Cardiff Acne Disability Index
CDLQI	Children Dermatology Life Quality Index
CG	Control group
DH	Damp-heat
DLQI	Dermatology Life Quality Index
EBM	Evidence based medicine
FFQ	Food frequency questionnaire
GAGS	Global Acne Grading System
ICR	Imbalance of chong-ren
IG	Intervention group
OC	Oral contraceptives
OR	Odds Ratio
PSQI	Pittsburg Sleeping Quality Index
PSS-4	Perceived stress scale – 4 item version
QOL	Quality of life
SD	Standard deviation
SPB	Stagnant phlegm or blood
SWM	Systemic western medicine
TCM	Traditional Chinese medicine
TT	Topical treatment
WH	Wind-heat
WTP	Willingness to pay
Yang-PG	Yang predominant group
Yin-PG	Yin predominant group

Publications

1. **Law, M.P.M.**, Chuh, A.A.T., Lee, A. (2006) Acne: its psychological consequences and management. *Hong Kong Practitioner*, 28, 1-5.
2. **Law, M.P.M.**, Chuh, A.A.T., Lee, A. (2009). Validation of Cantonese Cardiff Acne Disability Index. *Hong Kong Medical Journal, 15*, 12-7.
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4. **Law, M.P.M.**, Chuh, A.A.T., Molinari, N., Lee, A. (2009). An Investigation of the Association Between Diet and Occurrence of Acne: A Rational Approach from Traditional Chinese Medicine Perspective. *Clinical and Experimental Dermatology*, 35(1), 31-35.

Chapter I INTRODUCTION

1.1. PROBLEMS TO BE ADDRESSED

Acne is one of the most common skin conditions encountered in adolescence and young adults. It is estimated that the prevalence of acne ranges from 50% to 91% in western and eastern countries. The accompanying burden on medical service utilisation is substantial, accounting for 4% of the all visits by patients aged 15 to 19 years (Stern, 1999) and ranking the fourth most common reason of physicians' office visits for patients aged 11–21 years in the United States (Ziv, Boulet, & Slap, 1999). Acne was also the presenting complaint in 3.1% of patients aged 13 to 25 attending primary care in the United Kingdom (Purdy, Langston, & Tait, 2003). According to the morbidity pattern in Hong Kong, acne is most common skin disease among the adolescents in primary care setting (Lee, A., Chan, K., Wun, Y.T., Ling, M.P., Li, L., et al, 1995). As shown in a meta-analysis of isotretinoin treatment, it cost £ 750,000 per 100,000 beneficiaries of moderate to severe acne (Wessels, Anderson, & Kropman, 1999).

Except the physical morbidity, acne could bring about damage on psychological health as well. Acne is most commonly found at facial area because of the involvement of sebaceous units in its pathogenesis process. The very visual readiness and impossibility of coverage with clothes at this area could lead to considerable negative effects on quality of life for the sufferers. Evidence (Koo, 1995; Mulder, Sigurdsson, & van Zuuren, 2001) has shown that acne results in significant psychological problems, such as stigmatization from peers, lower self-esteem, interpersonal difficulties, anxiety, depression and higher unemployment rates. Severe psychological consequences such as depression, eating disorder and body dysmorphic disorder are not rare amongst patients with acne (Law, Chuh, & Lee,

2006).

Like most of the other common diseases, various knowledge or myths about the diet influence on clinical severity has been accumulating over years for acne with respect to different cultural traditions or beliefs. Therefore, the affirmation of such knowledge or the refutation of such myths is highly desirable for the hundreds of thousands of patients with acne. Traditional Chinese medicine (TCM), which has been developed and practiced in China for over 2000 years, profoundly acknowledges the diet-acne relationship. However, the validity of the evidence needs to stand the test of evidence-based medicine before putting it into practice for patients with acne.

1.2. REASONS FOR AND IMPLICATION OF THE PRESENT INVESTIGATION

The current study is necessary and valuable in addressing the followings:

First, the estimation of acne prevalence in Hong Kong has been based on studies conducted amongst westerners. A few have been conducted in Asian population, but their diagnoses were either only patient-rated or lacked the use of a validated tool for confirmed diagnosis of acne. In addition, the adolescent population of Hong Kong is largely ethnic Chinese yet their lifestyle is mainly western with retention of certain traditional practices. This indicates the importance of a customised investigation in Hong Kong.

Second, acne could bring about significant damage on psychological health as well. Nevertheless, there was hardly any study investigating the effects of acne on quality of life in Asians with an objective and properly validated measurement. The findings will be useful for other cities in China or Asia as the effect of common

adolescent health problems on quality of life (QOL) is an emerging issue.

Last, the inconsistent findings in previous studies regarding the dietary influence on acne suggested that the results might be biased in some studies due to small sample size, lack of control group, validity of distantly-recalled dietary habit, and vaguely-defined clinical severity. Moreover, as acne is a multi-factorial disease, the lack of sufficient control for the confounding factors such as individualised difference of body constitution, stress or medication use might have introduced biases in interpretation of the results in these studies.

1.3. AIMS AND RESEARCH QUESTIONS OF THE STUDY

The thesis was divided into two parts with two primary aims: to investigate the prevalence of acne and its effects on quality of life for the youth in Hong Kong, and to examine the association of diet and acne from a TCM perspective. Specifically, this thesis would answer the following six research questions:

1. What was the prevalence of acne amongst the Chinese adolescents and young adults in Hong Kong?
2. What was the impairment of quality of life resulting from acne and its relationship with the clinical severity of acne?
3. Was the translation of the Cantonese version of Cardiff Acne Disability Index valid?
4. Which other factor(s) was (were) responsible for the quality of life impairment as a result of acne?
5. Was certain foods associate with the occurrence of acne for (i) all subjects; (ii) subjects with yin predominant TCM body constitution; (iii) subjects with yang

predominant TCM body constitution?

6. Was TCM syndrome-tailored diet advice plus standard medical advice (intervention group) was more effective than standard medical advice alone (control group) in improving clinical severity of acne in adolescents?

1.4. OUTLINE OF THE THESIS

The thesis consists of five chapters. Chapter *II* describes the prevalence of acne and its psychological consequences patients with acne. It also reviews the diet-acne association from both western medicine and TCM perspective. Chapter *III* it reports the study method, and results of the cross-sectional study about the prevalence of acne and its effects of QOL. It also shows the translation and validation process of the Cantonese version of CADI. At the end of this chapter, it discusses the findings and limitations of the study. Chapter *IV* delineates the methodology and the findings of the cross-sectional study and the randomised controlled trial about the diet-acne relationship from a TCM perspective. It is followed by the discussion of the results and the limitations of the study. Chapter *V* is the overall conclusion of the thesis.

Figure I-1 describes the flow of participants at different sections in Chapter *III* and *IV*.

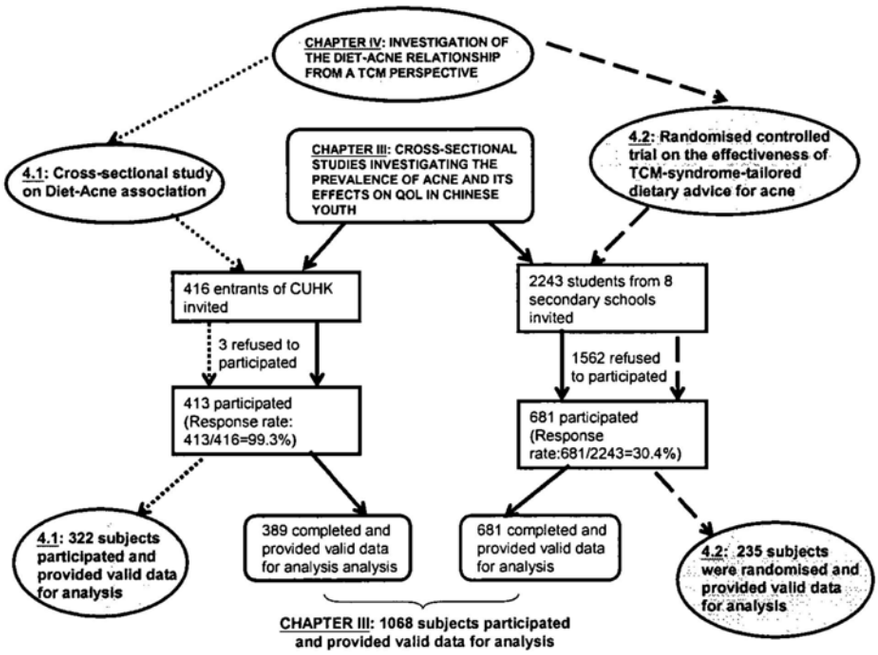

Figure I-1 Participants flow in Chapter *III* and *IV*

Chapter II LITERATURE REVIEW

2.1 OVERVIEW OF ACNE

Acne is the most common skin disorder of adolescence. The typical clinical manifestations are comedones (closed comedones and open comedones), papules, pustules, and nodules or cysts found on areas where pilosebaceous units are largest and most abundant such as face, neck, chest or back (Figure II-1). Lesions usually start at puberty but may persist into adulthood. The exact cause of acne is unknown. There are four main factors hypothesised to contribute to the development of acne: increased sebum production, follicular hyperproliferation of keratinocytes and the abnormalities of differentiation, colonisation of the blocked follicles by bacteria (*Propionibacterium acnes)*, and inflammation response. However, it is believed that it could be a result of increased level of androgen, increased end-organ responsiveness to androgen, heredity or genetics, or certain drugs.

The lesion types are defined primarily whether the sebaceous follicles are "non-inflammatory" or "inflammatory". Non-inflammatory lesions are open comedones and closed comedones, whereas inflammatory lesions are papules, pustules, and nodules.

The earliest morphological change of acne vulgaris in the pilosebaceous unit is abnormal follicular epithelial differentiation, giving rise to microcomedo (Figure II-2). Instead of going through the normal process of shedding and discharge through the follicular opening, the keratinocytes hyperproliferate and abnormally differentiate. This leads to the plugging of the upper follicle canal. Progressive enlargement of the microcomedo gives rise to clinically visible comedone, the non-inflammatory lesions of acne (Figure II-3). Closed comedones are called whiteheads because they stay beneath the skin and produce a whitish to flesh-coloured bump with an apparently

closed surface. Open comedones are also called blackheads because it appears as flat or slightly raised brownish to black plugs (Figure II-4). The dark colour is the result of the oxidation of melanin pigment.

If *Propionibacterium acnes* colonises the follicle duct and proliferate, inflammation will likely develop. Combining the above factors, the follicular epithelium is invaded by lympocytes and ruptures. Sebum, microorganisms, and keratin are released into dermis. Neutrophils, lymphocytes, and foreign-body giant cells accumulate and produce erythematic and swelling lesions. The superficial or deep inflammation results in the formation of pustules or papules respectively. The large and deep-seated abscesses could become nodules or cysts.

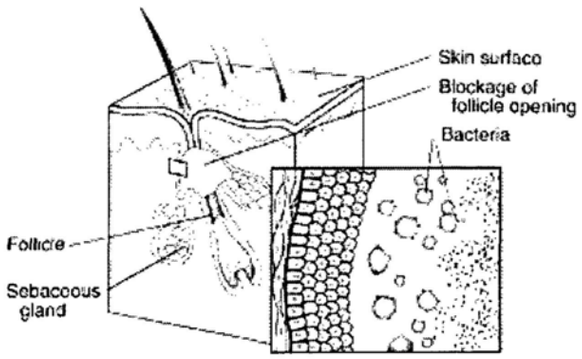

Figure II-1 The formation of microcomedone

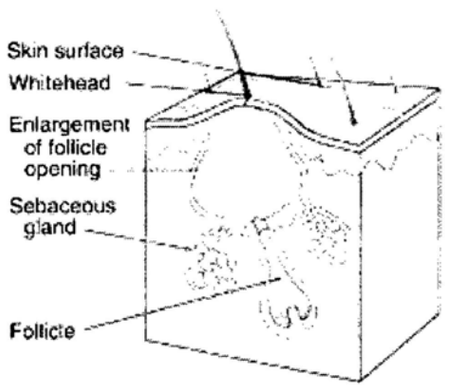

Figure II-2 The progression of the microcomedone and the formation of the non-inflammatory closed comedone

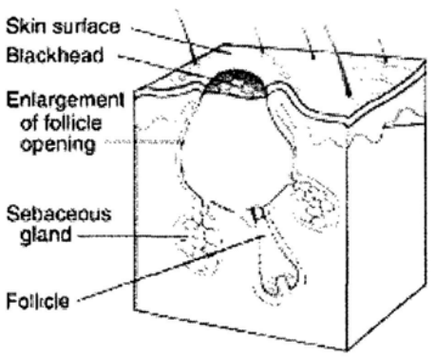

Figure II-3 The formation of open comedone

2.1.1. PREVALENCE OF ACNE

The estimates of prevalence of clinical severity of acne vary depending on the study methods and study populations (Table II-1). Data show that acne affects over 80% of people at some point in their life (Chu, 1997), and the incidence peaks at 17 to 18 years old (Cunliffe & Gould, 1979; Garner, 2003). Data shows that the prevalence of acne in Hong Kong was 9.8% amongst the school students aged 8 to 21 and was 90% amongst those aged 12.5 to 21 (Fung & Lo, 2000). In another telephone survey study, the prevalence of self-reported study was 91.3% for those aged between 15 to 25 (Yeung, Teo, & Chan, 2002).

A number of studies have been done to explore the acne prevalence in western countries. In a large sample of adolescence in New Zealand, 67.3% of the participants reported having acne (Purvis, Robinson, Merry, & Watson, 2006), and a population of similar age showed a higher prevalence at 81% (Lello, Pearl, Arroll, Yallop, & Birchall, 1995). In another study done in Australia with a sample of narrower age range (aged 16 to 18), 91% of males and 79% of females had acne to some degree (Kilkenny, Merlin, Plunkett, & Marks, 1998).

Most of the studies performed in European countries showed a relatively lower acne incidence than New Zealand and Australia. Except a study done in Portugal showing a prevalence at 82.1% (Amado, Matos, & Abreu, 2006), prevalence rates in United Kingdom (Smithard, Glazebrook, & Williams, 2001), Greek (Rigopoulos, Gregoriou, Ifandi, Efstathiou, Georgala, et al., 2007), Spain (Guerra, 2004), Sweden (Larsson & Leiden, 1980) were 50%, 59.2%, 73.6%, and 36.5% respectively. As for South American countries, there were two old studies at Mexico (Ruiz-Maldonado, Tamayo Sanchez, & Velazquez, 1977) and another study conducted at Brazil

(Bechelli, Haddad, Pimenta, Pagnano, Melchoir, et al., 1981), demonstrating a much lower prevalence rate at 9.9% and 2.7 respectively. Later on, data of acne incidence collected from Peru showed a prevalence of 41.7% (Freyre, Rebazza, Sami, & Lozada, 1998), which is much lower than New Zealand, Australia, and European countries. Some other data of prevalence for Arab Americans (El-Essawi, Musial, Hammad, & Lim, 2007) and people of Central Saudi Arabia (Al Robaee, 2005) and Nigeria (Yahya, 2009) were also found from literature, which are 37.7%, 56.2%, and 59.4% respectively.

The estimate of acne prevalence in Asia is comparatively limited. Only two studies from Singapore were found. In a large sample of subjects aged 10 to 19, the acne incidence was 28.9%. The prevalence increased to 52% for those aged between 20 to 29 (Chua-TY, Goh, & Koh, 1992). In a more recent Singaporean study, the self-reported acne was 88% and doctor-diagnosed acne was 100% (Tan, Tan, Barkham, Yan, & Zhu, 2007).

The inconsistent prevalence rate might be due to a number of factors, such as various assessment methods, ethnicity difference, deviation of the age of the sample, or even the socio-economical-cultural aspects of the populations.

Table II-1 Worldwide prevalence of acne

Study Place	Study Population (n)	Age range (yr)	Prevalence (%)	Diagnosis
Asia				
Hong Kong (Fung & Lo, 2000)	1006 447	8-21 12.5-21	9.8 90	Doctor-made
Hong Kong (Yeung, et al, 2002)	522	15-25	91.3	Self-made
Singapore (Chua-TY, et al, 1992)	8101 16898	10-19 20-29	28.9 52	Doctor-made
Singapore (Tan, et al, 2007)	1045 806	13-19	88 100	Self-made Doctor-made
New Zealand & Australia				
New Zealand (Purvis, et al, 2006)	9570	12-18	67.3	Self-made
Australia (Lello, et al, 1995)	867	16-19	84.4	Doctor-made

Australia (Kilkenny, et al, 1998)	2491	10-19	81	Doctor-made
Europe				
U.K. (Smithard, et al, 2001)	317	14-16	50	Doctor-made
Greek (Rigopoulos, et al, 2007)	347	13-18	59.2	Self-made
Portugal (Amado, et al., 2006)	1290	10-22	82.1	Doctor-made
Spain (Guerra, 2004)	3213	12-18	73.6	Self-made
Sweden (Larsson & Leiden, 1980)	8298	12-16	36.5	Doctor-made
South America				
Mexico (Ruiz-Maldonado, et al, 1977)	10,000	8-21	9.9	Doctor-made
Brazil (Bechelli et al, 1981)	9955	6-16	2.7	Doctor-made

Peru (EleodoroA. Freyre, 1998)	2214	12-18	41.7	Doctor-made
Others				
America (El-Essawi, et al., 2007)	401	20-80	37.7	Self-made
Central Saudi Arabia (Al Robaee, 2005)	717	18-24	56.2	Doctor-made
Nigeria (Yahya, 2009)	539	11-19	59.4	Self-report

2.1.2. PSYCHOLOGICAL CONSEQUENCES AND EFFECTS ON QUALITY OF LIFE FOR PATIENTS OF ACNE

Acne lesions could not only produce cutaneous scars, but also emotional disturbance. In 1948, Sulzberger and Zaldems first recognised the impact of acne on the mental state of patients: "There is no single disease which causes more psychic trauma, more maladjustment between parents and children, more general insecurity and feelings of inferiority and greater sums of psychic suffering than does acne vulgaris". The influence of acne should be interpreted as a function of patient demographic data, personality, baseline psyche status, attitudes from friends and family, coping skills, but not a mere reflection of the clinical severity.

The prevalence of acne vulgaris reaches its peak during adolescent years when they are undergoing physically, socially and psychologically critical development. The heightened concerns of body image, self-esteem or self- concept, as well as the desires for sexuality or dating issues amplify the consequence of lesion severity (Koo,1995) . It might be devastating enough to incur health-related quality of life impairment, psychosocial distress or even psychiatric sequelae.

The World Health Organization defined health as a "state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" in 1984. Since then, the impact of illnesses is acknowledged to be a capture of objective clinical measures of disease condition as well as patients' self-apprehension of the disability (Muldoon, Barger, & Flory, 1998). The latter is described by QOL. Literature search could best show the explosive increased concern for this regard. When the keyword "quality of life" is searched in MEDLINE database from 1950 to 1965, there is only one related article. When the same search strategy applied in the

MEDLINE database from 1966 to April Week 1 2006 renders a soaring 75,478 articles.

"Trivial" dermatological morbidity like acne was traditionally perceived as a mere cosmetic nuisance. Yet, evidences now emerge that acne patients reported comparable levels of diminished QOL as patients with chronic disabling asthma, epilepsy, diabetes, back pain or arthritis did (Mallon, Newton, & Klassen, 1999). Understanding QOL in acne patients has become a popular assessment of therapeutic benefits and an important outcome measurement in clinical practices and researches. Patient-orientated and consistent assessment is enabled with the use of QOL questionnaires (Finlay, & Khan, 1994; Chren, Lasek, Flocke, & Zyzanski, 1997; Anderson & Rajagopalan, 1997; Morgan, McCreedy, Simpson, & Hay, 1997; Gupta, Johnson, & Gupta, 1998; Fehnel, McLeod, Brandman, & Symonds, 2003; Layton, Seukeran, & Cunliffe, 1997). One of the acne-specific QOL questionnaires, Cardiff Acne Disability Index (CADI) (Motley & Finlay, 1992), was designed for investigating the disability caused by acne in routine management.

The Cardiff Acne Disability Index was developed by Prof. Andrew Y. Finaly and Dr. Richard J. Motley of the Department of Dermatology, Wales College of Medicine, Cardiff. The department is renowned for dermatology teaching and research, for which quality of life studies are one of their major focuses. CADI is a simplified version which was purposefully extracted from a longer Acne Disability Index (ADI) (Motley & Finlay, 1989) for the ease of busy physicians. CADI is succinct (consists of five questions and could be completed in 1-2 minutes) and patients over a wide range of age and intellectual ability can self-administer it without difficulty. The translation into Cantonese version was properly executed and

shown be a valid and reliable tool for local use.

For acne patients, the spectrum of psyche outcomes (Koo, 1995; Picardi, Mazzotti, & Pasquini, 2006; Marqueling & Zane, 2005) ranges from diminished self-assurance or self-image, emotional stress, social isolation to anger, anxiety, depression. These psyche problems, although not prevalent, would exist among acne patients. The outsight of such is jeopardous because this might further peril acne patients physically or psychologically. In the following paragraphs, we are going to discuss those supposed to cast greater disability, namely depression, eating disorders and body dysmorphic disorders (BDD).

Depression is gaining worldwide attention. It is the major psychiatric comorbidity of acne (Yazici et al, 2004) and was demonstrated to relate with suicide (Picardi, Mazzotti, & Pasquini, 2006). The highly efficacious treatment of severe acne, isotretinoin, is still controversial for its association with depression and suicidal behaviour (Marqueling & Zane, 2005). Although there lacks conclusive evidence, there is an utmost importance to figure out the possibility of depression in our acne patients.

A review article (Henkel et al, 2002) compared four screening tools of depression for acne patients, Hospital Anxiety and Depression Scale (HAD), the Brief Patient Health Questionnaire (B-PHQ), the General Health Questionnaire-12 item version (GHQ-12), and the World Health Organization -5 Well Being Index (WHO-5). The brief and highly sensitive WHO-5 was recommended as the best screening tool before referring the acne patients for further professional psychiatric assessment.

Some patients with acne improve their condition with exigent but scathing dieting, for example, by restricting meat and fatty food. This concept is especially deep-rooted in Chinese population because these "hot" foods are blamed for the induction of acne. Through possible mechanism of decreased serum androgen level during starvation, they succeed in eradicating their acne. However, with strong antipathy for their body image concerns, particular individuals might suffer from psychiatric disorders like anorexia nervosa (Lee, Leung, Wing, Chiu, & Chen, 1991) and bulimia nervosa (Gupta, Gupta, Ellis, & Voorhees, 1992).

Adolescence is when the upsurge of acne vulgaris coincides with the occurrence of personal fable. An imaginary audience 'staring' their appearances heightened the belief of own uniqueness and consciousness. Dysmorphic concern or the more severe end, the BDD, could be the tragic consequences. According to Diagnostic and Statistical Manual of Mental Disorders-IV, BDD is a somatoform disorder and is featured by the preoccupation with a specific body part and the belief that this body part is deformed or defective. A study showed that BDD was a common psychiatric disorder in acne patients (Phillips, Dufresne, Wilkel, & Vittorio, 2000). Another study demonstrated that about 14.1% of patients with mild acne were diagnosed with BDD (Bowe, Leyden, Crerand, Sarwer, Margolis, 2007).

All in all, acne can be disastrous to individual patients. Apart from the aforementioned psychological aspects, acne tends to impede the functional abilities. Unemployment, avoidance of normal social activities or backslid academic performance are likely to be resulted. Clinicians might not be the best assessors of the impact of the disease on daily activities, but the acne patients themselves would do so. Hopefully, compliance and efficacy of the treatment can be optimised through

(i) checking all the boxes above; (ii) yielding better doctor-patient relationship by showing more solicitude and empathy to acne patients; (iii) discussing the possible therapeutic strategies with them; (iv) explaining the possible side-effects, onset time and magnitude of treatment efficiency. Following these steps, we are truly adopting patient centred approach meeting the needs of patients.

2.2. ASSOCIATION BETWEEN DIET AND ACNE

There has been widespread recognition of dietary role in causing or exacerbating acne vulgaris amongst teenagers, patients with acne and even medical professionals. Pearl et al (1998) reported that 64.4% of the adolescents in Auckland believed acne was related to consumption of greasy food, and 50.4% believed acne was related to chocolate consumption. Tan et al (2004) also found that 32% of patients with acne believed diet was a cause of acne, and 44% believed diet aggravated acne in a Canadian questionnaire study. In another study carried out by in a dermatology Clinic in Michigan, 32% of patients of acne believed that dietary factors exacerbated the disease, and 68% incriminate chocolate specifically (Rasmussen and Smith, 1983). An interesting study done by Green and Sinclair (2001) showed that 41% of final year medical students at Melbourne University nominate dietary factors (especially chocolate, oily or fatty foods and high sugar-content foods) exacerbating acne. Surprising enough was that Brajac et al demonstrated that 70% of family physicians in Rijeka, Croatia, identify diet as causes of acne (Brajac, Bilić-Zulle, Tkalcić, Loncarek, Gruber, 2004).

2.2.1. EVIDENCE FROM A WESTERN MEDICINE PERSPECTIVE

A systematic review was done in 2003 and reviewed seven studies performed between 1956 to 2003. Most of them were conducted in the 50's to early 70's and suffered from conspicuous methodological flaws. It concluded that "..... there is not yet compelling evidence on which general practitioners or other clinicians can base advice regarding nutrition in relation to acne". The first documented intervention study investigating the nutrition linkage to acne was performed by Grant & Anderson (1965). Eight subjects were university students and asked to consume chocolate on two consecutive days, and no significant change was detected. However, the small sample size and lack of control group limited the results validity. Another well-known study examining if chocolate consumption was related with a higher likelihood of acne was done in Fulton, Plewig, & Kligman (1969). Acne clinic patients and male prisoners with mild to moderate acne was recruited and no difference in acne severity was found during the chocolate and control bar (without cocoa) study periods. However, it was later argued that the high fat content of the control bar was acneigenic and the four week study period may be too short compared with the natural history of acne. Interests in diet-acne linkage which diminished from mid 70's onwards have been resurging recently. Several intriguing studies regarding the hypothesised hyperinsulinaemic action of diet and its relationship with acne were found in the medical literature. The discussion was started by Cordain et al (2002) who conducted a cross-sectional study in the Paraguayan and New-Guinean tribal societies and observed no acne lesions in any subjects. Such phenomenon was assumed to be related with the typical western diet's hyperinsulinaemic action with subsequent androgen elevation. Robyn et al (2003) later on conducted a randomised controlled trial for 12 weeks to determine if a

low-glycemic-load diet improved acne lesion counts in 43 young men aged 15 to 25. The experimental diet involved a food composition of 25% energy from protein and 45% from low-glycemic-index carbohydrates. The control treatment was a high carbohydrates diet without any reference to glycemic index. As suggested by the authors, the nutrition-related factors may play a role in the reduction of acne severity, weight, and insulin sensitivity of the experimental group when compared to the control diet. However, it was also believed that further study was needed to isolate, if there was any, effects from weight loss in the underlying pathogenesis process of acne. Another study done by Kaymak et al (2007), nevertheless, reported dissimilar results. Forty-nine patients with acne and 42 healthy control subjects were studied for their fasting glucose, insulin, insulin-like growth factor-I, insulin-like growth factor binding protein 3, and leptin level at the initial visit. They were also asked to self-complete a questionnaire determining the frequency of their consumption of the specific amount of food, from which their overall glycemic index and dietary glycemic load were calculated. There were no significant difference found in all measurement and the authors concluded that the dietary glycemic index, glycemic load, and insulin level did not play a role in the major role in the acne pathogenesis in this sample. The dairy consumption and its connection with acne also received considerable attention, which was primarily based on two large studies performed by Adebamowo et al. The first study (Adebamowo et al, 2005) was a retrospective study done in a Nurse Health Study corhort to evaluate whether intakes of dairy foods during high school were associated with physician-diagnosed severe teenage acne. A positive association with acne for intake of total milk and skim milk was found after controlling for age, age at menarche, body mass index, and energy intake. The authors suggested the presence of hormones and bioactive molecules in milk might

account for the linkage. However, a major limitation of this study was the recall bias and misclassification of acne. An expanded study was also conducted by Adebamowo et al (2008). The sample was the male offspring of the women in the previous nurse study. In particular, it was a prospective cohort study examining 4273 boys who reported dietary intake on up to 3 food frequency questionnaires from 1996 to 1998 and teenaged acne in 1999. A positive association between intake of skim after the adjustment for age at baseline, height, and energy intake. The authors suggested again that the skimmed milk's hormonal constituents or factors that influence endogenous hormones may have biological effects in the consumers. However, this study only examined boys and introduced selection bias. Moreover, the findings were limited by the self-reported of acne and lack of validation of the self-report of acne.

2.2.2. EVIDENCE FROM A TRADITIONAL CHINESE MEDICINE PERSPECTIVE

TCM, which has been used for over 2000 years and has been gaining increased recognition in western societies, profoundly acknowledges the diet–acne relationship. In "Plain Questions of Yellow Emperor's Internal Medicine", the foundation of Chinese medicine theory and the most important TCM classical book, wrote "Gormandising can cause papule" ("Huang Di", 475-221 BC). This earliest Chinese medicine book also said, "Pain, papule and itchiness are originated from heatiness……; fatty foods can cause internal heatiness of body". In "Orthodox Manual of Surgery", another famous TCM classic, narrated that "When the fumes produced from stewing of food dregs in stomach reach lung, which turn into acne

vulgaris" (Chen, 1617). Contrary to the dogma in the western medicine dermatology textbook, the acne chapter of the textbook published nationally reads diet and acne is related and patients with acne should follow dietary rules (Lu, 1996).

The assumed homogeneity of patients from western medicine perspective could have confused the picture, leading to the opposite view on the dietary role on acne from western medicine and TCM perspectives. Such confusion is similar to that for chronic hepatitis B infection previously. Patients with hepatitis B were used to be termed as virus 'carriers', but this notation may be inferred as meaning that all carriers are homogenous, but assuming this means that the question of the best management for hepatitis B virus carriers is simply unanswerable. Once the patients are categorised by traits such as viral DNA load, presence of hepatis B e (HBe) antigen and HBe antibody, levels of transaminases, and co-infection with hepatitis C or D viruses or human immunodeficiency virus, then the question of management becomes more straightforward. Similarly, classifying different patients of acne may be useful in understanding the dietary role of acne.

A major principle of TCM is that the same pathological factor (e.g. diet) exerted on persons with different body constitutions could trigger different responses (e.g. occurence or severity of acne) (Zhu, 1995). With its sophisticated and characteristic individualised diagnosis, TCM could be a pertinent tool to classify different patients of acne in the evaluation of the diet-acne issue. The clinical presentation of any diseases, no matter how complicated it is, could be analysed with the eight principles according to its location, the nature, and the interaction between the pathological factors and ability to fight against disease (Wu, 1995). Specifically, the eight principles are yin and yang, internal and external factors, cold and heat aspect, and

deficiency or excess. These principles are the unique method used to differentiate the common factors underlying the diseases. Amongst all, yin and yang principles are the core which could be used to generalise the other six principles. The internal, cold, and deficiency are under the yin principle, while external, heat, and excess are under the yang principle. The signs and symptoms corresponding to yin principle include pale complexion, lethargy and fatigue, cold extremities, low voice, shortness of breath, bland taste in mouth, clear and profuse urination, loose bowel, pale tongue, and deep and weak pulse – which signifies the quietness, cold, and general hypoactivity of the body function. The signs and symptoms corresponding to the yang principle include flushed complexion, hot sensation or fever, restlessness, high voice, hoarse breath, thirst, yellowish and scanty urination, constipation, reddish tongue with yellowish coating, superficial, rapid and forceful pulse – which signifies the movement, heat, and general hyperactivity of the body function. Considering the succinct and comprehensive nature, yin and yang principles are the pertinent approach for the initial investigation of the diet-acne relationship from a TCM perspective.

Chapter III INVESTIGATION OF THE PREVALENCE OF ACNE AND ITS EFFECTS ON QUALITY OF LIFE IN CHINESE YOUTH

3.1. OBJECTIVES

The objectives of this part of the study were:

i) To determine the prevalence of acne amongst the Chinese adolescents and young adults in Hong Kong

ii) To investigate the impairment of quality of life resulting from acne and its relationship with the clinical severity of acne.

iii) To translate and validate the Cantonese version of CADI

iv) To explore the predictive factor(s) of quality of life impairment as a result of acne

3.2. METHODOLOGY

3.2.1. STUDY DESIGN

Two cross-sectional studies using a sampling method were conducted to determine the prevalence of acne among our sample of both adolescents and young adults aged from 13 to 28. To capture the youth sample with a broad age range, the sampling frame was based in secondary school students and university entrants. To recruit adolescents aged from 13 to 22, one study was implemented at eight governmental secondary schools in Hong Kong between November 2007 and March 2008 (referred as "Part A" thereafter). To recruit young adults aged from 17 to 28, another study was conducted at the general health evaluation for entrants of the Chinese University of Hong Kong in August 2006 (referred as "Part B" thereafter). The treatment history and predictive factors for acne disability were also investigated for subjects participated Part B as University students would provide a more accurate treatment history.

3.2.2. PARTICIPANTS

3.2.2.1. SECONDARY SCHOOLS (PART A)

RECRUITMENT OF SUBJECTS AND EXCLUSION CRITERIA

The data of this part of study are based on the screening and baseline information of the randomised controlled trial in Chapter *IV*. In brief, we recruited subjects from eight secondary schools in Shatin district of Hong Kong, China between November 2007 and March 2008. The non-participating schools in the district were no different from the participating ones in school types (aided or non-aided type, p=0.58), sex (co-education or single-sexed, p=0.45), and class structure (five-classes in each school grade or fewer-than-five in each school grade, p=0.58). Meetings were held with the teachers responsible for the arrangement of the study procedures at each school. Invitation letters and information sheets were then given to 2243 students in eight secondary schools which had prior experience in participating in research study. Finally, 681 informed consents were obtained from the subjects and the subjects' guardian before they participated in the study. The study was approved by the clinical research ethics committee of The Chinese University of Hong Kong.

PARTICIPANTS

Students were recruited from Form two to six (Grade eight to 12), aged from 11 to 21. Each school was approached consecutively until the minimum sample size was achieved. Subjects were excluded if: they (i) were not local residents; (ii) could not read Chinese; or (iii) were mentally incapable of giving informed written consent and unwilling to comply with study requirement.

3.2.2.2. UNIVERSITY ENTRANTS' HEALTH EVALUATION (PART B)

RECRUITMENT OF SUBJECTS AND EXCLUSION CRITERIA

A research meeting was held with the Director of the University Health Service and his co-coordinators before the study implementation. Our study materials were presented to, and reviewed by, them and their advice for a smoother and more practical data collection process was incorporated. Detailed procedure for the recruitment of subjects was undertaken to allow maximum participation.

PARTICIPANTS

All new entrants were invited to have their general health evaluations within five days. In 2006, we estimated 2,400 entrants would undergo general health evaluations so systematic sample was utilised to select every sixth of them. On the fourth day of our study, the number of subjects recruited was behind our expected number; hence every fifth students were recruited in order to obtain sufficient sample size for statistical analysis. Students were excluded if they (i) were not local residents; or (ii) could not read Chinese. Students' written informed consents were obtained before they participated in our study. Finally, 389 subjects participated in this part of the study.

3.2.3. INSTRUMENTS

3.2.3.1. GLOBAL ACNE GRADING SYSTEM (GAGS) – THE OBJECTIVE ASSESSMENT OF ACNE SEVERITY

GAGS (Doshi, Zaheer, & Stiller, 1997) is a quantitative evaluation of the clinical severity of acne. Originally, it considers six locations (on the face and trunk), with a factor based on surface area, and distribution and density of pilosebaceous units. The borders on the face are delineated by the hairline, jawline, and ears. The total acne score is the summation of the location subscores which are derived from multiplying the grading on a zero to four scale for the most severe lesion within a region (one for ≥one comedone, two for ≥one papule, three for ≥one pustule, and four for ≥one nodule) by the factor for each region (factor for forehead, right and left cheek is two, factor for chin and nose is one, and factor for chest and upper back is three). To minimise bias due to some study subjects declining adequate exposure for full examination of their chests and upper backs, we did not examine these locations. Hence, the original range of score (zero to 44) and the original severity classification (0 for none, one to 18 for "mild", 19 to 30 for "moderate", 31 to 38 for "severe", and >39 for "very severe") was adjusted on a pro rata basis, which becomes the modified score (zero to 32) and modified severity classification (0 for none, one to 13 for "mild", 14 to 22 for "moderate", 23 to 28 for "severe", and >29 for "very severe") (Figure III-1). The advantages of GAGS include the accuracy and reproducibility, simplicity to use by clinicians or researchers, and elimination of the tediousness of lesion counting and the expense of photography. No magnifying glass or skin sketching was allowed, and good lighting was suggested.

Location	Factor	×	Grade (0–4)*	=	Local score
I Forehead	2				
II Right cheek	2				
III Left cheek	2				
IV Nose	1				
V Chin	1				

	Global Score =	
* Grade 0: No lesions;	0:	"None"
Grade 1: ≥one comedone;	1 to 13:	"Mild"
Grade 2: ≥one papule;	14 to 22:	"Moderate"
Grade 3: ≥one pustule;	23 to 28:	"Severe"
Grade 4: ≥one nodule	29 to 32	"Very severe"

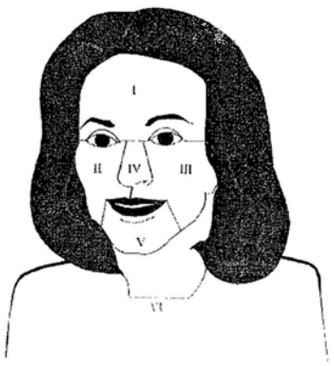

Figure 1 The six locations (I–VI) of the Global Acne Grading System (GAGS)

Figure III-1 Global Acne Grading System (GAGS)

TRAINING AND VALIDATION OF THE GAGS ASSESSORS

A series of training and validation steps were undertaken to ensure that the GAGS assessments of the raters were valid (Figure III-2). Specifically, a Consultant Dermatologist was invited to score with GAGS on the photos of 22 patients with acne, which was regarded as the golden standard for the validation. The rater then scored the same set of photos separately. If the correlation of the scores of the Consultant Dermatologist and the rater was high, the rater's score was considered valid. If such was low, the rater might consult the Consultant Dermatologist again, discussed the discrepancies. An exercise on the diagnosis of acne itself would then be conducted.

Learning materials including images of patients with acne and textual contents with the following syllabus were prepared:

1. Terminology and definitions of skin lesions in acne (closed comedones, open comedone, papules, pustules, nodules, cysts, excoriations, scars, lay terminology)
2. Clinical manifestations of acne
3. Classification and variants of acne
4. Recognition of signs in acne and diagnosis of acne
5. Knowledge and recognition of important differential diagnoses of acne (e.g. seborrhoeic dermatitis, perioral dermatitis, rosacea) on the face and on the trunk
6. Practical aspects and potential pitfalls in applying GAGS
7. Ethical and medico-legal pitfalls including the needs for informed consent,

presence of chaperone where necessary, and debriefing for subjects

The Consultant Dermatologist would comment and amend the learning materials when necessary. The rater then did a second round of scoring, the "post-training scoring" until the correlation became high, and rater's diagnostic skills in acne were validated. The results of the correlation of the golden standard with the "pre-training score" and the "post-training score" were compared. Only until the correlation reached medium or large (Cohen, 1988), the raters became systematically trained and validated GAGS assessor at the end of the process.

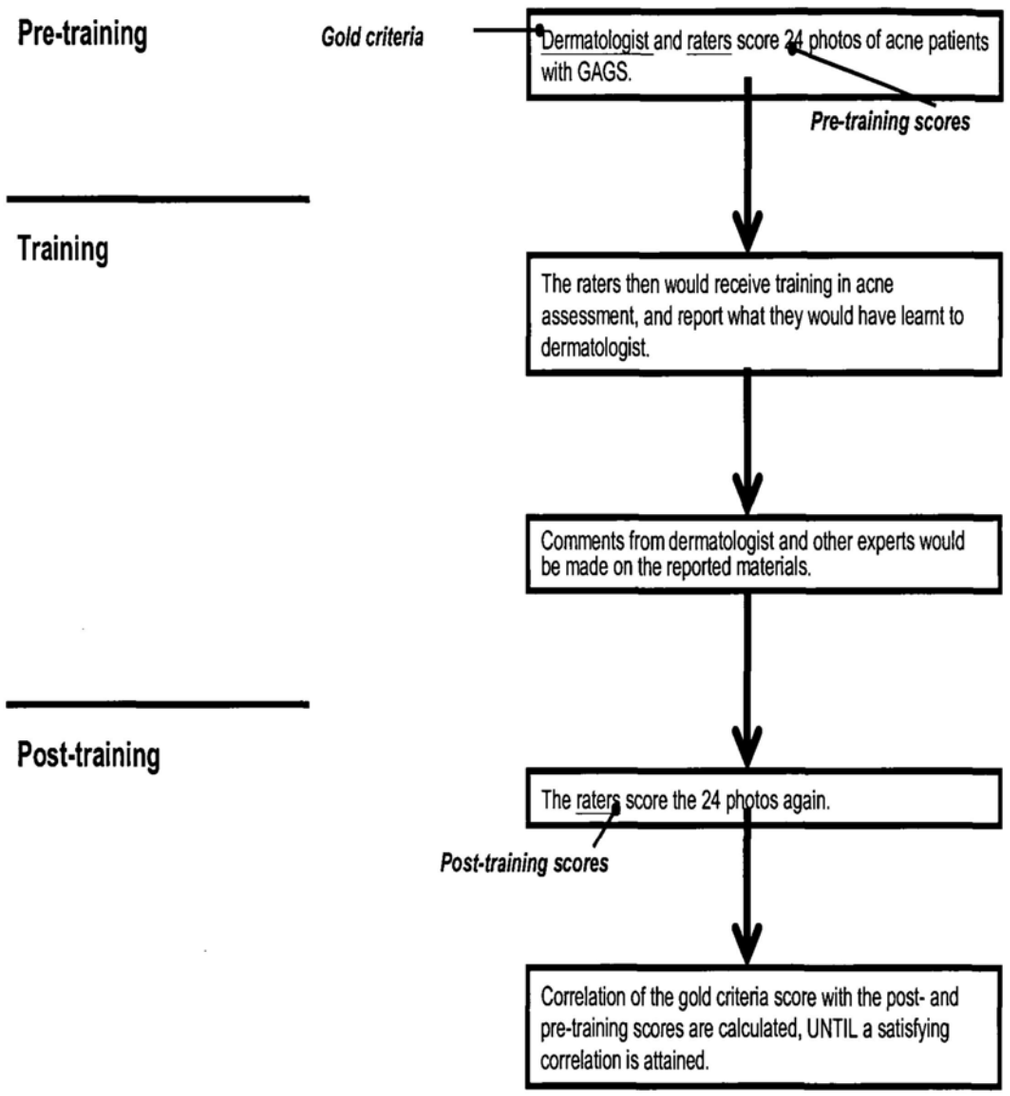

Figure III-2 Procedure of the training and validation for GAGS raters

3.2.3.2. CARDIFF ACNE DISABILITY INDEX (CADI) - THE SUBJECTIVE ASSESSMENT OF QUALITY OF LIFE AFFECTED BY ACNE

There exist a number of dermatology-specific (Finlay et al, 1994; Chren et al, 1997; Anderson et al, 1997, Morgan et al, 1997) or disease-specific questionnaires (Motley et al, 1989; Motley et al, 1992; Gupta et al, 1998; Fehnel et al, 2002; Layton et al, 1997), which could be used to assess the impact of acne on QOL. The CADI (Motley et al, 1992) is a five-question scale designed to assess the disability caused by acne— question one and two address the psychological and social consequences of acne in general; question three targets those with acne of the chest or back; question four enquires into the patient's psychological state; and question five asks for the patient's (subjective) assessment of current acne severity. The response to each question is scored from 0 to 3; a higher score indicates a greater disability resulted from acne. The original language of the CADI is English, and currently it has been translated into French (Dreno et al, 2004), Persian (Aghaei, Mazharinia, Jafari, & Abbasfard, 2006) and Ukranian (http://www.dermatology.org.uk/). At the time of writing, there was no acne-specific QOL questionnaire in Cantonese language.

TRANSLATION AND VALIDATION OF THE CANTONESE VERSION OF CADI

The goal of this part of the study was to assess the validity (face validity and criterion-related validity) and reliability (test-retest reliability and internal consistency) of the Cantonese version of the CADI, which would be subsequently used in the investigation of the QOL impact in our sample of patients with acne.

Translation

Written permission from the copyright holder of CADI to translate the index into Chinese was obtained. The repeated forward-backward translation process was adopted as it is the most popular, pragmatic, and adaptable strategy for this procedure. The CADI was translated into Chinese following the international recommendations (Wild et al., 2005). No professional translators were involved in the process, and thus hopefully a more representative translation for the wider public could be produced (Figure III-3).

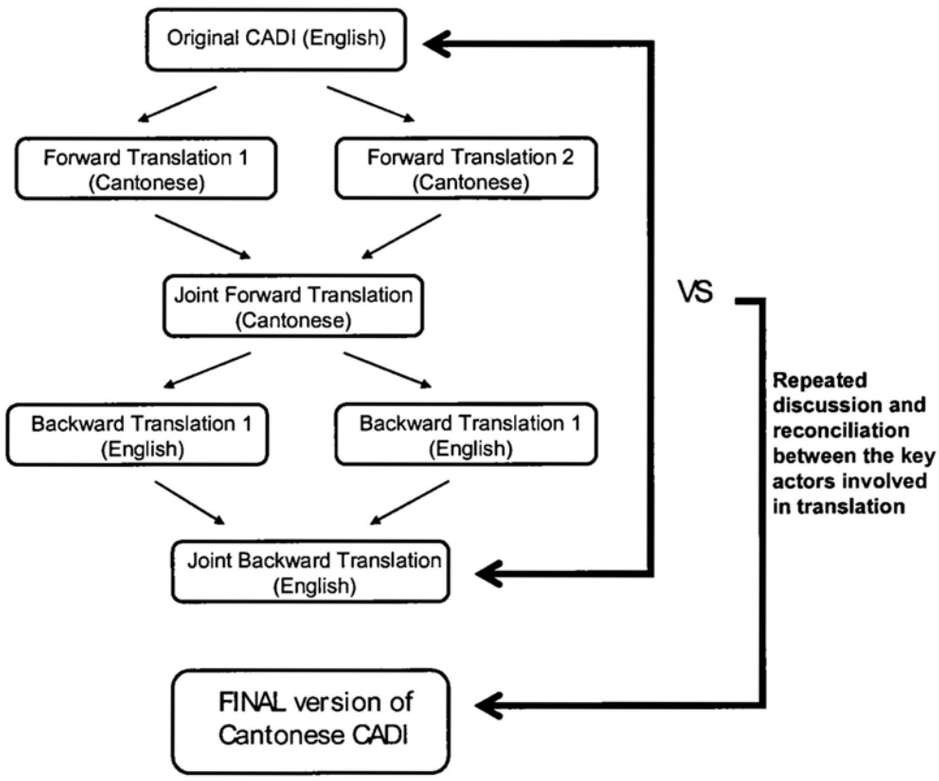

Figure III-3 The outline of the CADI translation and validation procedure

Specifically, the translators emphasised conceptual equivalence rather than a word-for-word translation. The translation from English into Chinese was performed by two independent bilingual subjects. During the translation process, both noted what the problems were and why there were problems. They then discussed their translations and produced a reconciled joint version. Two other independent bilingual individuals translated the joint version back into English. Any discrepancies from the original English version were noted and changes made to the translation followed by further checking and back-translation. Discrepancies and difficult issues were discussed with the original author (Prof Andrew Finlay) and thereby resolved through subsequent refinement. Seven secondary school students were cognitively debriefed with respect to comprehensibility, ambiguity of the items, and relevance to social context. Final adjustments were made as necessary (Appendix 2).

Validation

Two secondary schools offered the sampling frame, and were chosen because they were familiar with research procedures and capable of providing reliable data. Besides, the two schools were both co-educational and government-aided, which are typical of secondary schools in Hong Kong. The subjects sampled were considered suitable for our study. Students aged from 14 to 20 years and with Cantonese (a Chinese dialect) as their mother tongue were randomly selected and invited to participate. Each subject was asked to fill in a questionnaire consisting of the Cantonese CADI and Cantonese Dermatology Life Quality Index (DLQI; for those >16 years) or the Cantonese Children's DLQI (for those aged ≤16 years), without

any time limit. Both the Cantonese DLQI (http://www.dermatology.org.uk) and Cantonese Children's DLQI had been previously validated (Chuh, 2003). The clinical severity of acne was assessed using the GAGS score. The scoring method and procedure were consistent with all other parts involving the use of GAGS in this thesis. In brief, a systematically trained and validated rater examined the facial region of the subjects. Subjects were defined as none acne if the GAGS was zero, mild acne if the score was 1 to 13; moderate if it was 14 to 22; severe if it was 23 to 28; and very severe if it was 29 to 32. To assess the face validity, some of the subjects answered three aspects concerning each CADI question with a 5-point Likert scale: (a) relevance of the question to acne; (b) appropriateness of application of the question to acne patients; and (c) clarity of the questions. To assess the criterion-related validity, the correlations of the Cantonese CADI scores with the Cantonese DLQI or Cantonese Children's DLQI of all subjects were analysed, as were those for the GAGS scores. In addition, to evaluate the test-retest reliability, some of the subjects were asked to fill in the Cantonese CADI again after a mean of 14 days. This interlude was supposed to be short enough to preclude any changes in health status and long enough to prevent the students remembering their prior answers. The face validity was presented with descriptive data. The criterion-related validity was assessed by analysing the correlation between the Cantonese CADI scores and the Cantonese DLQI or Cantonese Children's DLQI, using the Spearman rank order correlation coefficient (γs). For comparison, a similar analysis was performed for GAGS scores. A correlation coefficient of ≥ 0.4 was deemed satisfactory. Internal consistency was analysed by Cronbach's alpha coefficient, for which ≥ 0.7 was considered satisfactory. The test-retest reliability was analysed by γs and the intra-class correlation coefficient (ICC), for which ≥ 0.7 was regarded as

satisfactory. Descriptive analysis was performed whenever appropriate. All data analyses were carried out with the Statistical Package for the Social Sciences (Windows version 13.0; SPSS Inc, Chicago [IL], US). Students were free to choose whether to participate or not. Informed consent was obtained before the study commenced.

Results

All seven students taking part in the cognitive debriefing were satisfied that the CADI could be comprehended readily. No item was considered ambiguous or irrelevant in terms of social context. No further amendments were made.

Among the 96 students invited, 95 (response rate, 99%) consented to participate. Ten failed to fully complete the questionnaire and therefore 85 subjects completing it (completion rate at 89%) were included in the final analysis. Fifty-five (64.7%) of them were from School A and 35 (35.3%) were from School B. Twenty-five (29%) were males and 60 (71%) were females. The mean (SD) age of the subjects was 16 (2) years; 50 (59%) were aged 16 years or less, and 35 (41%) were above 16. The mean GAGS score was 13.0 (SD 7.0), ranging from 2 to 28. Forty-four (51.8%) of the subjects had mild acne, 32 (37.6%) had moderate acne, nine (10.6%) had severe acne, and none (0%) had very severe acne. The mean CADI score was 2.91 (SD 2.23), with a range from 0 to 12. For the subjects aged 16 or below, the mean CDLQI score was 2.76 (SD 3.49) and ranged from 0 to 18. For the subjects aged above 16, the mean DLQI score is 3.66 (SD 3.89) and ranged from 0 to 16.

A total of 55 students were asked to answer questions examining face validity, which gave satisfactory results (Table III-1).

Table III-1 Results of the questions examining the face validity

		Q1	Q2	Q3	Q4	Q5
Relevance of the question to acne	Mean (SD)	2.83 (1.13)	3.04 (1.35)	2.19 (1.10)	3.11 (1.20)	3.85 (1.14)
	Median	3.0	3	2	3	4
	Range	1-5	1-5	1-5	1-5	1-5
Clarity of the question	Mean (SD)	3.67 (1.13)	4.02 (0.86)	3.56 (1.20)	3.28 (1.20)	3.59 (1.14)
	Median	4	4	4	3	4
	Range	1-5	2-5	1-5	1-5	1-5
Appropriateness of applying the question to patient with acne	Mean (SD)	3.59 (1.35)	3.63 (1.19)	2.93 (1.37)	3.33 (1.30)	4 (1.05)
	Median	3	4	3	3	4
	Range	1-5	1-5	1-5	1-5	1-5

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Among the 85 students included in the final analysis, the relationship between the Chinese CADI and DLQI was strong (γs=0.58) and significant (P=0.004) (Figure III-4). The strength of the relationship between the Chinese CADI and Cantonese DLQI was also large (γs=0.72) and significant (P<0.001) (Figure III-5).

Regarding internal consistency, Cronbach's α was 0.763 for the collective analysis of scores for all five questions. The correlation between the Chinese CADI score and GAGS score was not strong (γs=0.352, P=0.001). A total of 33 students completed the test-retest reliability test; the resulting correlation of the first and second administration of Chinese CADI was strong (γs=0.795, P<0.001). The ICC of 0.784 was satisfactory (P<0.001). Descriptive data of the Chinese CADI and the comparison with the original English CADI are shown in Table III-2.

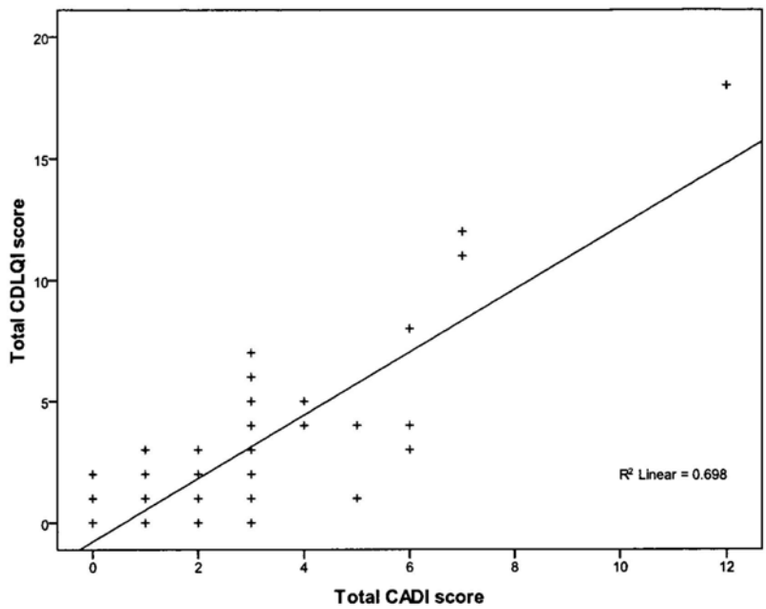

Figure III-4 The scatterplots result representing the participants' score on total CADI score and total CDLQI score for those aged under 16 (n=50)

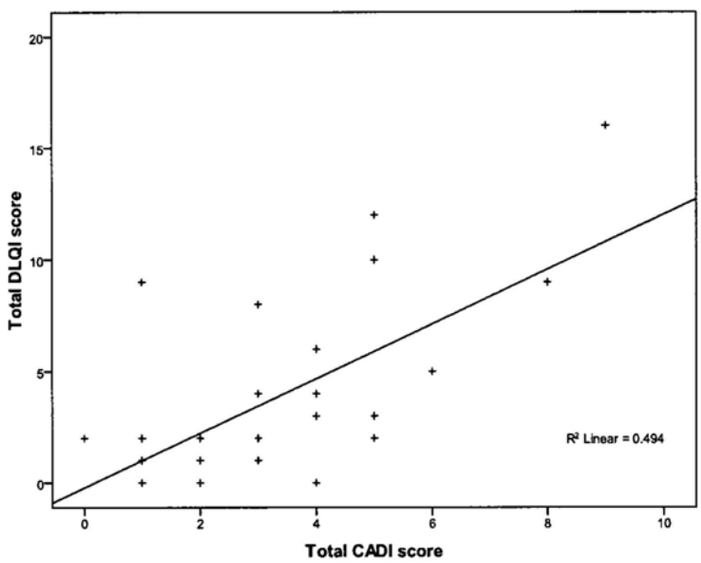

Figure III-5 The scatterplots result representing the participants' score on total CADI score and total CDLQI score for those aged 16 or above (n=35)

Table III-2 Results of the validation study for the Cantonese version of the CADI and the reported study of the original English version

		Results of the validation study of the Cantonese CADI			Results of a reported study of the English CADI (Motley, 1992)		
	Question	Mean score (SD)	Median score	Range	Mean score	Median score	Range
All subjects (N=85)	1	0.54 (0.65)	0	0-3	1.24	1	0-3
	2	0.26 (0.54)	0	0-3	0.97	1	0-3
	3	0.08 (0.32)	0	0-2	0.82	0	0-3
	4	1.06 (0.66)	1	0-3	1.86	2	1-3
	5	0.96 (0.84)	1	0-3	1.58	2	0-3
	Total	2.91 (2.23)	2	0-12	6.47	6	2-14
Subjects with mild acne (N=44)	1	0.3 (0.46)	0	0-1			
	2	0.16 (0.37)	0	0-1			
	3	0.02 (0.15)	0	0-1			
	4	0.93 (0.59)	1	0-2			
	5	0.66 (0.65)	1	0-2			
	Total	2.07 (1.52)	2	0-6			
Subjects with moderate acne (N=32)	1	0.81 (0.69)	1	0-3			
	2	0.34 (0.65)	0	0-3			
	3	0.13 (0.41)	0	0-2			
	4	1.22 (0.71)	1	0-3			
	5	1.25 (0.92)	1	0-3			
	Total	3.75 (2.42)	3	1-12			
Subjects with severe acne (N=9)	1	0.78 (0.83)	1	0-2			
	2	0.44 (0.73)	0	0-2			
	3	0.22 (0.44)	0	0-1			
	4	1.11 (0.78)	1	0-2			
	5	1.44 (0.88)	1	0-3			
	Total	4 .0 (3.04)	3	1-9			

3.2.3.3. WILLINGNESS TO PAY QUESTIONS

The concept of willingness to pay (WTP) has been used for assessing QOL and health-state utilities in dermatology (Motley et al, 1989). It asks about how much money patients are willing to pay for a hypothetical cure of acne. Two WTP questions were used in Part B. The first question was "*Imagine that a new product is available for the treatment of acne. Imagine that this product is much more effective than previous treatments and is almost certain to cure your acne. How much would you be prepared to pay for this treatment*". The second question was "*Would you rather receive the cure at no cost to you, or would you rather receive HK$15,000 but will never receive the cure?*" As majority of acne cases would be treated in private sector, it is important to test the association of WTP and QOL.

3.2.3.4. PERCEIVED STRESS SCALE — 4 ITEM VERSION

Since stress (Chiu, Chon, & Kimball, 2003) is believed to be an important confounder of acne severity and QOL, Perceived Stress Scale-4 (PSS-4) (Cohen, Kamarck, Mermelstein, 1983) was used to measure the stress levels of the subjects. It is a four-item self-report instrument with a five-point scale, measuring the degree to which situations over the past month are perceived as stressful. The higher the score is, the more the stress is reflected.

3.1.4. SAMPLE SIZE DETERMINATION

From a previous study, the estimated prevalence of self-rated acne in Hong Kong was 52.2%. According to the formula:

$$N=Z^2 (p) (1-p) / d^2$$

$$N=(1.96)^2 (0.52) (1-0.52) / (0.03)^2$$

$$N=1065$$

where Z = Z value (1.96 for 95% confidence level), p is the estimated prevalence, d is the margin of error (±3%). It was estimated that at least 1065 subjects should be recruited.

3.2. RESULTS

3.2.1. RESPONSE AND PARTICIPATION OF SUBJECTS

Totally, 2653 students were invited to participate in our study, and 1068 students fulfilled the entrance criteria, completed the study procedure, and provided valid data for prevalence estimate. Hence, the overall response rate was 40.0%. In part A, 2243 students were invited and 681 students completed the study, rendering a response rate at 30.0%. In part B, 416 students were invited and 387 students completed the study, giving a response rate at 93.5%. The older students are more likely to participate and complete our study. Details of the response rate by age and gender are presented in

Table III-3.

	Participants	**Non-participants**	**Total**
Total	***1068 (100)***	***1585 (100)***	***2653 (100)***
Gender			
Male (%)	485 (45.4)	502 (31.7)	987 (37.2)
Female (%)	583 (54.6)	1083 (68.3)	1666 (62.8)
Mean Age (SD)	16.94 (2.08)	15.94 (1.67)	16.34 (1.90)
Age distribution			
13 or below (%)	37(3.5)	38 (2.4)	75(2.8)
14 to 15 (%)	270(25.3)	655 (41.3)	925 (34.9)
16 to 17 (%)	269(25.2)	560 (35.3)	829 (31.2)
18 to 19 (%)	421(39.4)	303 (19.1)	724 (27.3)
20 or above (%)	71(6.6)	29 (1.8)	100 (3.8)

Table III-3 Gender and age characteristics of the participants and the non-participants

3.2.2. DEMOGRAPHIC CHARACTERISTICS OF SUBJECTS

Table III-4 shows the age and gender of the students of secondary two to six and university entrants participating in the study. There were more females (54.6%) participating in our study. The mean age was 16.9 (SD 2.1), with a range of 13 to 27. Subjects aged between 14 to 19 made up almost the 90% of our sample. For the purpose of analysis, the few subjects aged 30 or older were excluded.

Table III-4 Gender and age characteristics of subjects in Part A (secondary students) and Part B (university entrants)

	Secondary two to six (%)	**University entrants (%)**	**Total (%)**
Total	***681 (100)***	***387 (100)***	***1068 (100)***
Gender			
Male	280 (41.1)	205 (53.0)	***485 (45.4)***
Female	401 (58.9)	182 (4.07)	***583 (54.6)***
Mean age (SD)	15.80 (1.6)	19.0. (1.0)	***16.9 (2.1)***
Age distribution			
13 or below	37(5.4)	0 (0)	***37 (3.5)***
14 to 15	270 (39.6)	0 (0)	***270 (25.3)***
16 to 17	258 (37.9)	11 (2.8)	***269 (25.2)***
18 to 19	109 (16)	312 (80.6)	***421 (39.4)***
20 or above	7 (1)	64 (16.5)	***71 (6.6)***

3.3. PREVALENCE RATE OF ACNE

Over 93% of the subjects had a certain degree of acne (Figure III-5). Specifically, more than half of the subjects had mild acne (52.7%), and more than one-third of them had moderate acne (35.5%). The proportion of severe acne in males (7.0%) was much higher than females (2.9%). Because there were only very few (n=2) subjects in the very severe acne group, it was combined with the severe acne group (written as "severe to very severe acne group") thereafter. The age group of 14 to 15 (7%) showed the highest proportion of subjects having severe acne. Most of the subjects with none acne were aged 18 to 19 (13.3%) or 20 or above (21.1%).

If we took a more conservative approach by considering that mild acne is a normal physiological sign in adolescents, the prevalence of clinical acne (moderate and severe to very severe acne) was 40.4% (n=432) (Figure III-6). There were more males (43.2%) diagnosed with clinical acne than females (38.0%), and prevalence of clinical acne was highest in the age group of 16 to 17, followed by age group of 14 to 15. More details are shown in Table III-6.

Table III-5 Five-level distribution of acne severity according to gender and age

	No acne (%)	**Mild acne (%)**	**Moderate acne (%)**	**Severe acne (%)**	**Very severe acne (%)**
Total (n=1068) (%)	***73 (6.8)***	***563 (52.7)***	***379 (35.5)***	***51 (4.8)***	***2 (0.2)***
Gender					
Male (n=485) (%)	37 (7.6)	238 (49.1)	175(36.1)	34(7.0)	1(0)
Female (n=583) (%)	36 (6.2)	325 (55.7)	204(35.0)	17(2.9)	1(0)
Age					
13 or below (n=37) (%)	1 (2.7)	24 (64.9)	11 (29.7)	1 (2.7)	0 (0)
14 to 15 (n=270) (%)	0 (0)	141 (52.2)	110 (40.7)	19 (7.0)	0 (0)
16 to 17 (n=269) (%)	1 (0)	127 (47.2)	130 (48.3)	11(4.1)	0 (0)
18 to 19 (n=421) (%)	56 (13.3)	233 (55.3)	113 (26.8)	17 (4.0)	2 (0)
20 or above (n=71) (%)	15 (21.1)	38 (53.5)	15 (21.1)	3 (4.2)	0 (0)

Table III-6 Two-level distribution of acne severity according to gender and age

	No or physiological acne (%)	Clinical acne (%)
Total (%)	***636 (59.6)***	***432 (40.4)***
Gender		
Male (n=485)	275 (56.7)	210 (43.3)
Female (n=583)	361 (61.9)	222 (38.1)
Age		
13 or below (n=37)	25 (67.6)	12 (32.4)
14 to 15 (n=270)	141 (52.2)	129 (47.8)
16 to 17 (n=269)	128 (47.6)	141 (52.4)
18 to 19 (n=421)	289 (48.6)	132 (31.4)
20 or above (n=71)	53 (74.6)	18 (25.4)

The overall mean GAGS score of participating students was 11.9 (SD 6.5), ranging from 0 to 29. The mean GAGS score for the males was slightly higher than for the females, and the difference was not significant ($p=0.33$). The age group of 16 to 17 showed the highest GAGS score. Post-hoc analysis of ANOVA test (Turkey HSD test) showed age group of 16 to 17 manifested a significantly higher GAGS score than the age group of 13 ($p=0.034$), 18 to 19 ($p<0.0001$), and 20 or above ($p<0.0001$), but insignificantly different from the age group of 14 to 15 ($p=0.893$) (Table III-7).

There was a peak of severity of acne at the age group of 16 to 17 for both males and females. Females showed a higher severity of acne than males at the both ends of the age range (age groups of 13 or below and 20 or above). However, the differences were insignificant ($p=0.76$ and $p=0.60$ respectively). For the other age groups, males presented a higher acne severity, but the difference was only significant for the age group of 16 to 17 ($p=0.02$), but not significant for the age groups of 14 to 15 ($p=0.23$) and 18 to 19 ($p=0.56$).

Table III-7 Severity of acne as measured by mean GAGS score in relation to gender and age

GAGS score	Mean (95% confidence interval)	Median	Standard deviation	Minimum	Maximum
All subjects (n=1068)	***11.9 (11.5 to 12.3)***	***12***	***6.5***	***0***	***29***
Gender					
Male (n=485)	12.1 (11.5 to 12.7)	12	6.9	0	29
Female (n=583)	11.7 (11.2 to 12.2)	12	6.1	0	29
Age					
13 or below (n=37)	11.0 (9.0 to 13.1)	10	6.2	0	23
14 to 15 (n=270)	13.7 (13.1 to 14.4)	13	5.4	1	28
16 to 17 (n=269)	14.2 (13.6 to 14.8)	14	5.0	0	28
18 to 19 (n=421)	9.9 (9.3 to 10.6)	10	7.0	0	29
20 or above (n=71)	8.2 (6.5 to 10.0)	8.0	7.2	0	28

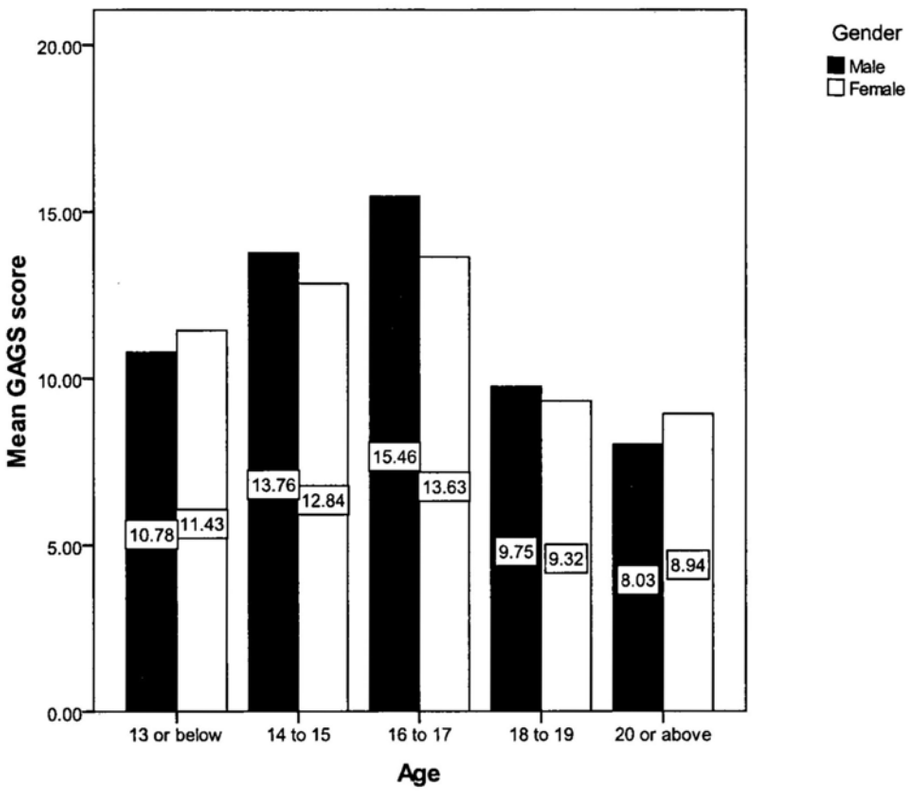

Figure III-6 Comparison of severity of acne as measured by mean GAGS score with respect to gender and age

Logistic regression was conducted to assess whether the variables of gender and age significantly predict a subject had clinical acne or not. Subjects aged 14 to 15 and 16 to 17 were significantly associated with increased odds of having clinical acne (crude OR = 1.91 [95% CI = 1.11, 4.76] for the age group 14 to 15; crude OR = 2.30 [95% CI = 1.11, 4.76] for the age group 16 to 17). The male gender was not significantly associated with a higher odd of having clinical acne (crude OR = 1.24 [95% CI = 0.97, 1.59]) (Table III-8). Having adjusted by age, the males became significantly associated with an increased odds of having clinical acne when compared with the females (adjusted OR = 1.36 [95% CI = 1.06, 1.76]). When adjusted by gender, the age group of 16 to 17 persisted to associate significantly with higher odds of having clinical acne (Table III-9).

Table III-8 Crude Odds ratio for having clinical acne in relation to age and gender

Variable	**None or physiological acne (%)** **(N=636)**	**Clinical acne (N=432)**	**Crude Odds ratio (95% CI)**
Gender			
Male	275 (43.2)	210 (48.6)	1.24 (0.97, 1.59)
Female	36 (56.8)	222 (51.4)	1
Age			
13 or below	25 (3.9)	12 (2.8)	1
14 to 15	141 (22.2)	129 (29.9)	1.91* (1.11, 4.76)
16 to 17	128 (20.1)	141 (32.6)	2.30* (1.11, 4.76)
18 to 19	289 (45.4)	132 (30.6)	0.95 (0.46, 1.95)
20 or above	53 (8.3)	18 (4.2)	0.71 (0.30, 1.69)

* $p<0.05$

Table III-9 Age-adjusted odds ratio and gender-adjusted odds ratio for having clinical acne

Variable	**None or physiological acne # (%)** **(N=636)**	**Clinical acne (N=432)**	**Adjusted Odds ratio (95% CI)**
Gender			
Male	275 (43.2)	210 (48.6)	1.36* (1.06, 1.76)
Female	36 (56.8)	222 (51.4)	1
Age			
13 or below	25 (3.9)	12 (2.8)	1
14 to 15	141 (22.2)	129 (29.9)	2.06 (0.99, 4.29)
16 to 17	128 (20.1)	141 (32.6)	2.45* (1.12, 5.10)
18 to 19	289 (45.4)	132 (30.6)	0.99 (0.48, 2.04)
20 or above	53 (8.3)	18 (4.2)	0.73 (0.30, 1.74)

*$p<0.05$

3.3.1. THE EFFECTS OF ACNE ON QUALITY OF LIFE

Only subjects with GAGS ≥14 (i.e. clinical acne) were used for data analysis in this part (Table III-10).

The overall mean CADI score was 3.61 (SD 2.16), ranging from 0 to 15. The mean CADI scores for different genders and age groups are shown in Table III-10 and Figure III-7. Females showed a significantly higher CADI score than males (p=0.001). The CADI score differed significantly across the age groups (p=0.017), post-hoc Turkey test showed the CADI score of the age group of 16 to 17 was significantly higher than age group of 14 to 15, but the difference between the other age groups were insignificant.

Females consistently had higher CADI score than males across all age groups, the difference between gender was significant for the age group of 16 to 17 (p=0.048), but not significant for the age group of 13 or below (p=0.145), 14 to 15 (p=0.054), 17 to 18 (p=0.059), and 20 or above (p=0.094) (Figure III-7).

Table III-10 Quality of life affected by acne as measured by mean CADI in relation to gender and age

CADI score	Mean (95% confidence interval)	Median	Standard deviation	Minimum	Maximum
All subjects (n=427)	***3.6 (3.4, 3.8)***	***3***	***2.2***	***0***	***15***
Gender					
Male (n=207)	3.3 (3.0, 3.6)	3	2.16	0	15
Female (n=220)	4.0 (3.7, 4.2)	3	2.1	0	12
Age					
13 or below (n=12)	4.7 (3.3, 6.1)	4	2.2	2	10
14 to 15 (n=124)	3.1 (2.9, 3.4)	3	1.5	0	8
16 to 17 (n=141)	3.9 (3.5, 4.2)	3	2.3	0	13
18 to 19 (n=132)	3.8 (3.3 to 4.2)	3	2.5	0	15
20 or above (n=18)	3.3 (2.5 to 4.1)	3	1.6	0	6

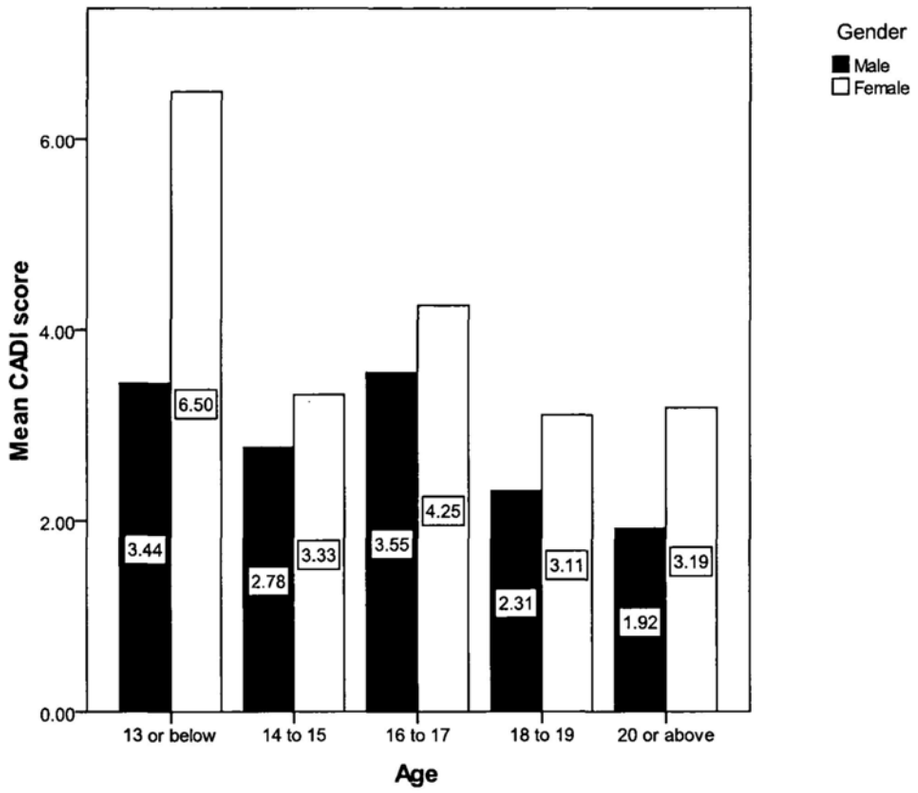

Figure III-7 Comparison of quality of life affected by acne as measured by mean CADI score with respect to gender and age

The subjects' responses to each of the five CADI questions are shown in Table III-11 to Table III-15.

For the first question of CADI ("As a result of having acne, during the last month have you been aggressive, frustrated or embarrassed?), most subjects (64.4%) described they were "a little aggressive, frustrated or embarrassed". A lot more males (36.7%) regarded their general psychological condition being "not affected by acne at all" than the females did (14.0%). The older age groups (age 18 to 19 and 20 or above) tended to be less affected (41% and 33.3% respectively) by acne than the younger age groups. Some noticeable proportions of the subject in the age groups of 16 to 17 (2%) and 18 to 19 (2.9%) expressed that they were "very much indeed" psychologically disturbed by their acne.

For the second question of CADI ("Do you think that having acne during the last month interfered with your daily social life, social events or relationships with members of the opposite sex?), most subjects (75%) did not feel any social consequence because of acne. Over 30% of the older subjects (aged 18 to 19 and 20 or above) reported moderate to severe interference in social activity as a result of their acne. A worth-mentioning proportion (2.1%) in the age groups of 16 to 17 considered their acne "severely, affecting all activities".

For the third question of CADI ("During the last month have you avoided public changing facilities or wearing swimming costumes because of your acne?), most subjects (91.2%) were not bothered by their acne on their chest and back. The male-female proportion in different options were more or less the same. "All the time" was used to describe their bad experience in public changing facilities or

wearing swimming costumes because of their acne by a notable proportion of the subject in the age groups of 16 to 17 (6.4%).

For the fourth question of CADI ("How would you describe your feelings about the appearance of your skin over the last month?), almost 95% of the subjects showed negative feelings (occasionally concerned, usually concerned, or very depressed and miserable). Fewer females (7.2%) were "not bothered" by their skin appearance when compared to males (17.6%), while at the same time, the proportion of subjects who reported "usually concerned" with their skin appearance in females (21.6%) were almost twice that in males (11.4%). A remarkable percentage (6.4%) of subjects in the age group of 16 to 17 were "very depressed and miserable" about their skin appearance.

For the fifth question of CADI ("Please indicate how bad you think your acne is now:"), one-third of the patients self-rated that their acne is a "major problem" or "the worst it could possibly be". Amongst them, females (33.8%) were even more likely to self-indicate such than males (25.3%) were. The older age groups tended to assess themselves having more severe acne.

Table III-11 Response to the first question of CADI enquiring about the general psychological consequence of acne ("As a result of having acne, during the last month have you been aggressive, frustrated or embarrassed?") (N=432)

Answer	**Not at all (%)**	**A little (%)**	**A lot (%)**	**Very much indeed (%)**
All subjects (%)	***121 (28.0)***	***278 (64.4)***	***26 (6.0)***	***7 (1.6)***
Gender (%)				
Male (n=210)	77 (36.7)	119 (56.7)	12 (5.7)	2 (1.0)
Female (n=222)	31 (14.0)	159 (71.6)	14 (6.3)	5 (2.3)
Age (%)				
13 or below (n=12)	2 (16.7)	7 (58.3)	2 (16.7)	1 (8.3)
14 to 15 (n=129)	31 (28.9)	93 (67.5)	5 (3.6)	0 (0)
16 to 17 (n=141)	25 (17.8)	102 (71.3)	11 (8.9)	3 (2.0)
18 to 19 (n=132)	57 (41.0)	64 (49.5)	8 (6.7)	3 (2.9)
20 or above (n=18)	6 (33.3)	12 (66.7)	0 (0)	0 (0)

Table III-12 Response to the second question of CADI enquiring about the social consequence of acne ("Do you think that having acne during the last month interfered with your daily social life, social events or relationships with members of the opposite sex?") (N=432)

Answer	**Not at all (%)**	**Occasionally or in only some activities (%)**	**Moderately, in most activities (%)**	**Severely, affecting all activities (%)**
All subjects (%)	***324 (75)***	***88 (20.4)***	***16 (3.7)***	***4 (0.9)***
Gender (%)				
Male (n=210)	159 (75.7)	43 (20.5)	4 (1.9)	4 (1.9)
Female (n=222)	165 (74.3)	45 (20.3)	12 (5.4)	0 (0)
Age (%)				
13 or below (n=12)	8 (66.7)	2 (16.7)	2 (16.7)	0 (0)
14 to 15 (n=129)	110 (85.3)	19 (14.7)	0 (0)	0 (0)
16 to 17 (n=141)	107 (75.9)	22 (15.6)	9 (6.4)	3 (2.1)
18 to 19 (n=132)	88 (66.7)	38 (28.8)	5 (3.8)	1 (0.7)
20 or above (n=18)	11 (61.1)	7 (38.9)	0 (0)	0 (0)

Table III-13 Response to the third question of CADI enquiring about the bad experience as a result of the acne on chest and back ("During the last month have you avoided public changing facilities or wearing swimming costumes because of your acne?") (N=432)

Answer	**Not at all**	**Occasionally**	**Most of the time**	**All of the time**
All subjects (%)	***394 (91.2)***	***24 (5.6)***	***3 (0.7)***	***8 (1.9)***
Gender (%)				
Male (n=210)	195 (92.9)	8 (3.8)	2 (0.9)	2 (0.9)
Female (n=222)	199 (89.6)	16 (7.2)	1 (0.5)	6 (2.7)
Age (%)				
13 or below (n=12)	11 (91.7)	1 (8.3)	0 (0)	0 (0)
14 to 15 (n=129)	123 (95.3)	3 (2.3)	0 (0)	0 (0)
16 to 17 (n=141)	127 (90.1)	9 (6.4)	2 (1.4)	3 (2.1)
18 to 19 (n=132)	116 (87.9)	10 (7.6)	1 (0.8)	5 (3.8)
20 or above (n=18)	17 (94.4)	1 (5.6)	0 (0)	0 (0)

Table III-14 Response to the fourth question of CADI enquiring about the subjects' psychological status ("How would you describe your feelings about the appearance of your skin over the last month?") (N=432)

Answer	**Not bothered**	**Occasionally concerned**	**Usually concerned**	**Very depressed and miserable**
All subjects (%)	***53 (12.4)***	***293 (68.6)***	***69 (16.2)***	***12 (2.8)***
Gender (%)				
Male (n=210)	37 (17.6)	145 (69.0)	21 (11.4)	4 (1.9)
Female (n=222)	16 (7.2)	148 (66.7)	48 (21.6)	8 (3.6)
Age (%)				
13 or below (n=12)	1 (8.3)	10 (83.3)	1 (8.3)	0 (0)
14 to 15 (n=129)	24 (18.6)	82 (63.6)	17 (13.2)	1 (0.8)
16 to 17 (n=141)	12 (8.5)	108 (76.6)	12 (8.5)	9 (6.4)
18 to 19 (n=132)	13 (9.8)	81 (61.4)	36 (27.3)	2 (1.5)
20 or above (n=18)	3 (16.7)	12 (66.7)	3 (16.7)	0 (0)

Table III-15 Response to the fifth question of CADI enquiring about the subjective assessment of current acne severity ("Please indicate how bad you think your acne is now:") (N=432)

Answer	**Not a problem (%)**	**A minor problem (%)**	**A major problem (%)**	**The worst it could possibly be (%)**
All subjects (%)	*21 (4.9)*	*278 (65.1)*	*118 (27.6)*	*10 (2.3)*
Gender (%)				
Male (n=210)	16 (7.6)	138 (65.7)	47 (22.4)	6 (2.9)
Female (n=222)	5 (2.3)	140 (63.1)	71 (32.0)	4 (1.8)
Age (%)				
13 or below (n=12)	0 (0)	2 (16.7)	9 (75.0)	1 (8.3)
14 to 15 (n=129)	6 (4.7)	90 (69.8)	26 (20.2)	2 (1.6)
16 to 17 (n=141)	5 (3.5)	96 (68.1)	36 (25.5)	4 (2.8)
18 to 19 (n=132)	7 (5.3)	82 (62.1)	40(30.3)	3 (2.3)
20 or above (n=18)	3 (16.7)	8 (44.4)	7 (38.9)	0 (0)

3.3.2. CORRELATION OF THE CLINICAL SEVERITY AND QUALITY OF LIFE AFFECTED BY ACNE

The overall correlation of GAGS score and CADI score was small and significant (Pearson correlation=0.147, p=0.002, n=432).

The correlations in both males and females were small. The correlation within age group of 17 to 18 (Pearson correlation=0.23, p=0.045, n=76) was small and significant. The correlations of the other age groups were all small and insignificant.

The correlation for those with moderate acne (Pearson correlation=-0.054, p=0.413, n=229) and severe acne ((Pearson correlation=-0.191, p=0.266, n=36) were small.

The correlations for different age groups and acne severity are shown in Table III-16.

Table III-16 Correlations between clinical severity of acne and quality of life affected by acne with respect to gender, age, and level of acne severity

	Correlation coefficient	p-value
Gender		
Male (n=210)	0.059[a]	0.425
Female (n=222)	*0.138[a]	0.041
Age		
13 or below (n=12)	0.31[b]	0.327
14 to 15 (n=129)	0.132[a]	0.144
16 to 17 (n=141)	0.100[a]	0.240
18 to 19 (n=132)	0.239[a]	0.006
20 or above (n=18)	-0.281[b]	0.259
Level of acne severity	0.019[a]	0.707
Moderate acne group (GAGS=14 to 22) (n=379)		
Severe to very severe acne group (GAGS=23 to 32) (n=53)	0.234[a]	0.098

[a] Pearson correlation
[b] Spearman's rho
* Significant findings ($p<0.05$)

Willingness to pay

Only data of subjects from Part B (i.e. university entrants) were used in 3.2.6, 3.2.7, and 3.2.8. Subjects with none or physiological acne were also used for comparison purpose in the statistical analyses.

From the first WTP question *(Imagine that a new product is available for the treatment of acne. Imagine that this product is much more effective than previous treatments and is almost certain to cure your acne. How much would you be prepared to pay for this treatment?)*, 64 (15.5%) were willing to buy it at about HK$1,000 or above, 154 (37.3%) would spend about HK$500 for it and 195 (47.2%) subjects chose not to purchase the hypothetic cure for acne. If only the acne group was considered, 53 (16.7%) were willing to buy it at about HK$1,000 or above, 129 (40.7%) would use about HK$500 for it and 135 (42.6%) chose not to buy it. For those with physiological or clinical acne, females were significantly more willing to pay more for the hypothetic cure than males ($p<0.001$).

For the second WTP question *(Would you rather receive the cure at no cost to you, or would you rather receive HK$15,000 but will never receive the cure?)*, 63 subjects preferred a free course of the hypothetic treatment to a granted sum of HK$15,000 which is the approximate cost for a full course of systemic isotretinoin treatment in HK.

3.3.3. TREATMENT HISTORY

Over the past six months, 13 (3.2%) respondents used traditional Chinese medicine (TCM) to treat acne, 15 (3.9%) took systemic western medicine (SWM) for

their acne, and 115 (30.3%) used topical treatment (TT) for their acne. Regarding the modalities of treatment, those having utilised TCM ($p<0.001$), SWM ($p<0.001$) or TT ($p<0.001$) were found to have more severe acne and greater acne disability than their treatment naïve counterparts. Details of the relationship between treatment history with acne severity and disability are shown in Table III-17.

Table III-17 Relationship between treatment history with severity of acne and quality of life affected by acne

Did you use the following acne treatment in the past six months?		**GAGS score (p value)**		**CADI score (p value)**	
Traditional Chinese medicine	Yes No	12 7.94	(p=0.017)	5.38 2.47	(p<0.0001)
Systemic western medicine	Yes No	13.4 7.86	(p=0.003)	5.5 2.44	(p<0.0001)
Topical treatment	Yes No	11.03 6.78	(p<0.0001)	3.92 1.97	(p<0.0001)

3.3.4. PREDICTIVE FACTORS OF IMPAIRED QOL

Multivariate logistic regression analysis for the CADI scores was performed to confirm the above results. Gender, GAGS score, WTP, previous treatment(s) of acne and PSS score were adjusted for the analysis. The results are shown in Table III-18.

Female gender ($P = 0.002$), higher GAGS score ($P < 0.001$), higher perceived stress ($P = 0.01$) and willingness to pay Hong Kong $15,000 for a hypothetical permanent cure ($P = 0.03$) were positive predictors for a higher disability resulted from acne.

Table III-18 Results of multivariate logistic regression, with CADI as dependent variable

Factors		**Reference group**	**Adjusted Odds ratios (95% CI)**
Male	Vs	Female	0.377[#] (0.202-0.705)
GAGS score		N/A	1.119[*] (1.056-1.187)
Amount of money paid for the hypothetical cure		N/A	1.214 (0.789-1.870)
Hypothetical cure preferred	Vs	15,000 HKD preferred	9.102[#] (1.148-72.187)
TCM user	Vs	Non CM user	1.128 (0.102-12.457)
SWM user	Vs	Non SWM user	0.458 (0.044-4.746)
TT user	vs	Non TT user	1.138 (0.618-3.086)
PSS score		N/A	1.205[#] (1.043-1.392)

[*] $p<0.0001$
[#] $p<0.005$

3.4. DISCUSSION

Acne is prevalent amongst the late adolescents in Hong Kong and results in a considerable QOL impairment. The association of acne disability and clinical severity of acne is not strong. The Cantonese CADI, with equivalent to the original English version, constituted a valid and reliable tool for measuring QOL effects as a result of acne. It is the first study using objective and validated tools to assess the acne severity (GAGS) and acne disability (Cantonese CADI) amongst the Hong Kong adolescents and young adults. It was also the first study to investigate the prevalence of objectively diagnosed clinical acne after adjustment of the age and gender for Asian populations.

Acne prevalence and acne disability

Two sampling frames (secondary schools and university entrants) were used to obtain a sample with a wider age range. At the time of the study, 93.2% of the participants had a certain degree of acne and more than 40% of them were diagnosed with clinical acne according to the GAGS categorisation. Male had a significantly higher likelihood of having clinical acne after adjustment of age, such was also reported in two studies (Smithhard et al, 2001; Lello et al, 1995). However, not all studies showed such findings (Yeung et al., 2002; Fung et al, 2000; Tan et al., 2007). A reason for the discrepancy could be these studies were using a less stringent and clear criteria to define the occurence of acne (e.g. self-reporting nature, cut-off between "no acne" and "have acne"). This literally implies the fact that males have more severe acne we use a more proper definition, which deserves equal, if not more, amount of the care providers' attention and treatment resources. Subjects aged 14 to 17 had a significantly higher acne severity when compared with other age groups

after adjustment for gender.

Our findings recapitulated the study of Mosam et al (Mosam, Vawda, Gordhan, Nkwanyana, & Aboobaker, 2005) that severity of acne was not significantly correlated with psychological distress. As acne is not a life threatening condition, the main aim of treatment should be optimisation of the subjective well being of patients, not merely controlling the clinical severity as rated by physicians. Emphasising patients' QOL was shown to enhance dermatological patients' satisfaction (Renzi et al, 2001). Self-rated health by patients has also been shown to bear strong predictive validity for morbidity and mental health, independent of other physiological, behavioural, and psychosocial risk factors (Farmer & Ferraro, 1997). The correlation of GAGS and CADI was further weakened as the subjects' clinical severity of acne increased. This suggests that the more severe the acne is, the less predictive physician-rated severity is in exploring the psychosocial stress and treatment needs for the patient.

Another implication from our results hinting a better care for patients of acne is the gender issue. Although diagnosed in the same categorization of clinical severity of acne, our female subjects reported significantly higher CADI score than the male subjects across different clinical categorizations. Such is consistent to Yeung et al's (2002), Smithhard et al (2001) and Uslu et al's (2008) studies. The heightened concerns of self image could be echoed from Stern RS's study (2000) which narrated the male-to-female ratio of visits to dermatologist owing to acne was 3:5, denoting the need for gender-specific management protocol for acne patients.

Although students were impaired physically and psychologically, two findings in their treatment seeking behaviour were surprising. Firstly, previous treatments of

acne were not significant factors in predicting QOL impairment. Secondly, a significant number of subjects had "moderate, severe or very severe acne" but did not actively seek treatment. Amongst them, 84 (93.3%) was not treated by TCM, 83 (92.2%) did not take SWM, and 42 (47.7%) did not manage their acne by TT during the past six months. These imply a group of patients who could potentially have benefited from medical intervention are under-presented to clinicians. This could be explained by ignorance of the existence of effective treatments for acne or low accessibility to specialists' care. Yeung et al (2002) stated that over half of their respondents did not know whether effective treatments were available. Purvis et al (2004) found that students having "problem acne" were more likely, by an odds ratio of 5.29, to report difficulty accessing medical treatment for acne. This also reflects possible limited access to specialists' care, as supported by the findings of Chan et al (2000) that the dermatologist to patient ratio is 1:120,000 in HK and that the locations of most dermatologists' clinics are distributed unevenly. The public should be educated and informed about appropriate medical services that are available to ensure timely treatment.

Translation of CADI

We developed the Cantonese version of the CADI according to international guidelines. We also fulfilled the standard requirement for establishing face validity, criterion-related validity, internal consistency, and test-retest reliability. To the best of our knowledge, this was the first properly validated acne-specific QOL questionnaire in the Cantonese language. It is succinct, for day-to-day clinical use, and more importantly, it adds a patient-orientated dimension to medical records, identifies

patients with unusually high levels of disability, and increases relevant information on which physicians can base therapeutic decisions.

There are two reasons why we translated the CADI into Cantonese, the written language common to all dialects. We assumed that a quality questionnaire written in the official language should not only assure accuracy and consistency for data collection, but also minimise loss to follow-up. Notably, Cantonese is the dialect predominantly spoken by people living in Guangdong Province where Hong Kong is located. Thus, a Cantonese CADI enables identical questions being asked both in a written and oral context. This is particularly advantageous for collecting QOL data via phone calls from those who default follow-up visits. Another reason is that some patients may be illiterate and need to have the questionnaire read aloud to them.

The correlation of acne sufferers' QOL and clinical severity elucidated from our results was weak, which was incongruent with the Persian validation study (Aghaei et al, 2006). This, however, should not be regarded as a weakness of the CADI validation process, since all other statistical tests attained the required standard for validating a translated instrument. In fact, the dissociation of clinical severity and impact of acne has been reported in many other studies (Jones-Caballero, Chren, Soler, Pedrosa, & Peñas, 2007; Mulder MM et al., 2001; Mallon et al., 1999). It highlights the indispensable need for filling the gap between the clinical definition of acne and patients' self-perceived impact of the skin problem, echoing the aim of developing and validating QOL measurement for patients of acne.

Face validity refers to how valid a measurement 'looks', which is generally regarded as just a crude and subjective glimpse at validity. We attempted to quantify the three aspects of face validity using a three 5-point Likert scale of responses.

Almost all questions attained a satisfactory rating except the question dealing with "relevance of the question to acne" and "appropriateness of applying the question to patients with acne". This may be due to insufficient cross-cultural adaptation, but the real reason needs further study. To the best of our knowledge, the currently published CADI validation studies (Dreno et al, 2004; Aghaei et al, 2006; http://www.dermatology.org.uk/) did not report the data for crude face validity. We included such data in our study in an attempt to elucidate the respondents' subjective opinions of our validation with a relatively quantifiable measure.

3.5. LIMITATIONS OF THE STUDY

A limitation of the study is that the general population was not sampled due to resource constraints. Females (54.6%) constituted a larger proportion than males due to our recruitment strategy (one of the school is a girl school). However, the sex-ratio was compared with the census data and the difference was not statistically significant ($p=0.146$). As local data of acne prevalence and its effects on QOL with validated measurement are not available, it is hoped that this exploratory study will provide the foundation for a future population-based study.

In addition, the response rate of the Part A was lower than that of Part B. A reason for this could be the different ways of inviting them to participate in our study. In Part A, information sheet and consent letter were given to them by schools, the research staff did not meet the students and explain in person about the study's procedure and significance. These might refrain the students from participation because they did not feel involved and informed directly. In Part B, on the other hand, the research staff met each of the invited students at the University Health Centre so

that they described the every details of the study and might have encouraged the willingness of involvement and thus participation.

As for the study of the CADI translation and validation, the limitations were its small sample size and that our subjects had lower CADI scores for the Cantonese version than were encountered in studies validating the English CADI version (Table III-2). There is no acne clinic in Hong Kong and we had difficulty in reaching patients with 'clinical acne' within our limited resources. Further studies extending the sampling base are therefore called for.

3.6. SUMMARY

Acne is prevalent in Hong Kong and has considerable psychological effects. The association between clinical severity and impaired QOL is not strong. The Cantonese Cardiff Acne Disability Index was equivalent to the original English version, and constitutes a valid and reliable tool for day-to-day clinical use.

Chapter IV INVESTIGATION OF THE DIET-ACNE RELATIONSHIP FROM A TRADITIONAL CHINESE MEDICINE PERSPECTIVE

4.1. CROSS-SECTIONAL STUDY: AN INVESTIGATION OF THE ASSOCIATION BETWEEN DIET AND OCCURRENCE OF ACNE

Albeit widespread imputation of dietary factors in causing or exacerbating acne amongst patients with acne (Tan et al, 2001; Rasmussen et al, 1983) and even medical professionals (Green et al, 2001; Braiac et al, 2004), academics of western medicine (Magin et al, 2005; Strauss et al, 2007) could suggest no compelling evidence regarding the role of diet in acne. The persisting dissociation between the study results preached by researchers and personal experience testified by the laymen and clinicians still warrants the scrutiny of the paradox. Recent studies have reported intriguing results which proposed diet-induced hyperinsulinemia (Cordain et al, 2002) and the intake of whole and skimmed milk (Adebamowo et al, 2005) were associated with increased likelihood of acne. However, these studies were study results have since been thrown into doubt following commentary and review by commentary and review (Bershad, 2003; Bershad, 2005).

The emphasis on individualised TCM diagnosis and treatment (Zhu, 1995), implying that the same contributory factor (e.g.diet) exerted on persons with different body constitutions could trigger dissimilar responses (e.g. occurrence of acne), might bridge the gap. We thence proposed the use of yin and yang (Wu Dunxu, 1995), the prime principal of TCM, to classify the study subjects into yin and yang predominant body constitution. The hypotheses of this study were: (i) foods do not associate with the occurrence of acne for all subjects; (ii) certain foods do not associate with the occurrence of acne for subjects with yin predominant body constitution; and (iii) certain foods do not associate with the occurrence of acne for subjects with yang predominant body constitution.

4.1.1. OBJECTIVE

The objective of this part of the study was to investigate if foods associate with the occurrence of acne for (i) all subjects; (ii) subjects with yin predominant TCM body constitution; (iii) subjects with yang predominant TCM body constitution

4.1.2. STUDY DESIGN

It was a cross-sectional study amongst the new entrants to a university in Hong Kong, China. All new entrants were invited to participate in our study if they were local residents and could read Chinese.

4.1.3. PARTICIPANTS

The sampling frame was the same as that in Part B of section 3.1.2.2. In brief, of the 416 invited students, 27 students refused to participate, hence the response rate was 93.5% (389/416). Later, 67 provided incomplete data for subsequent analysis hence the completion rate was 77.4% (322/416).

4.1.4. INSTRUMENTS

4.1.4.1. CLINICAL DIAGNOSIS OF SEVERITY OF ACNE

GAGS, the clinical grading system for the severity of acne, was utilised (please refer to the details of "Global Acne Grading System (GAGS) – The objective assessment of acne severity" in Chapter *III.*). In brief, one systematically trained and validated rater of GAGS scored clinical acne severity for all the study participants. The GAGS score and the categorization of clinical severity of acne were shown in Figure III-1.

4.1.4.2. CATEGORISATION OF SUBJECTS WITH DIFFERENT TCM YIN OR YANG BODY CONSTITUTION

The core of TCM theory is the principle of yin and yang, which is a succinct tool for categorising subjects useful for initial investigation diet-acne relationship from a TCM perspective. We utilised a published method to quantify the yin and yang aspects of the subjects (Langevin, 2004). We recruited four practitioners who were formally trained in TCM in Hong Kong and were fully registered with the TCM council in Hong Kong. They collected clinical information from the participants, using the four TCM diagnostic skills of inspection, listening and smelling, enquiry and palpation. They then quantified the participants' yin and yang by analysing the signs and symptoms according to the 'eight principles' of yin versus yang, interior versus exterior, cold versus heat, and deficiency versus excess. (Zhu Wenfeng, 1995). From their assessment, the four practitioners assigned each subject a score of yin and a score of yang on a scale of – 10 to +10, with zero representing a 'balanced' score. Each subject's mean yin and yang scores were then calculated and the relative difference (yin score minus yang score) was derived, representing which of the two predominated over the other. If the difference was > 0, the subject was assigned to the yin-predominant group (yin-PG), and if the difference was < 0, they were assigned to the yang-predominant group (yang-PG) (Appendix 1a and 1b)

The diagnosis and assessment in TCM is necessarily holistic and qualitative. We previously considered using more objective methods such as quantifying each of the eight principles in order to derive the 'balanced' score, but we consulted leading TCM professors, who considered such an approach to be reductionist, and thus we based our investigation on this holistic approach.

4.1.4.3. DIETARY DOMAIN OF THE VALIDATED YOUTH RISK BEHAVIOUR QUESTIONNAIRE

The validated Youth Risk Behaviour Questionnaire (Hong Kong adapted version) was used to investigate the participants' dietary habits (Lee & Tsang, 2004). Consumption of 11 categories of food over the 7 days preceding the study was assessed. The categories were (i) snacks; (ii) chocolate or sweets; (iii) dried food; (iv) foods from street stalls (examples were listed with photos mainly dim sum, fish balls); (v) desserts, ice-cream, cake, tart; (vi) soft drinks; (vii) sweet beverages; (viii) fruit juices; (ix) fresh fruit; (x) vegetables; and (xi) dairy or soy milk, and the frequencies were 0 times / week, 1–2 times / week, 4– 6 times / week, 1 time / day, 2 times / day, 3 times / day and ‡ 4 times / day. We also included other data that might affect severity of acne, such as gender, age, body mass index, medication history (including oral contraceptives) for the 6 months preceding the study, tobacco and alcohol habits, sleeping quantity and quality, psychological or emotional problems, and perceived stress (rated by the Perceived Stress Scale 4 (Cohen et al., 1983). We did not include family history of acne because the conclusive evidence of the role of heredity on clinical acne severity is still lacking, (Ballanger, Baudry, N'Guyen, Khammari, & Dréno, 2006; Herane & Ando, 2003) and such self-reported information could be inaccurate because of nonstandardised diagnoses and recall bias (Appendix 2).

4.1.5. STATISTICAL ANALYSIS

Baseline characteristics for all participants and for each group were calculated

as mean, median or percentage. Multivariate logistic models were used for all participants and for each group respectively to test the independent association of foods with the occurrence of clinical acne. The obtained regression model contains all the diet variables (we did not perform any selection procedure in the model), hence the model was adjusted to all the measured diet variables. $P < 0.05$ (two-tailed) was considered to be significant, and odd ratios and confidence intervals were calculated. All analyses were performed using SAS software (version 8; SAS Institute, Chicago, IL, USA).

4.1.6. RESULTS

Participants were divided into two groups according to GAGS: (1) the clinical acne group ($n = 82$; 25.2%) comprising those with moderate, severe or very severe acne, and (ii) the reference group ($n = 240$; 74.5%), comprising those with no or only mild acne (we considered that mild acne is a normal physiological sign in adolescents).

Table IV-1 presents the participants' details. The yin-PG group comprised 155 participants (48.1%) and the yang-PG group comprised 167 (51.9%). Characteristics that might affect the severity of acne (gender, body mass index, smoking and drinking habits) were evenly distributed between both groups.

Table IV-1 Characteristics of study subjects in yin predominant group (yin PG), yang predominant group (yang PG) and all subjects

	All subjects (n=322)	**Subjects in yin PG** (n=155)	**Subjects in yang PG** (n=167)
Mean age, y	19.1 (1.7)	19.2 (2.2)	18.9 (1.1)
Women, %	47.0	45.2	46.7
Body Mass Index, k/m²	20.5 (6.4)	19.9 (2.7)	20.3 (3.4)
Smoker (more than six cigarettes per day), %	0	0	0
Frequent alcohol drinker (more than four times per week), %	0	0	0
Psychological or emotional problem, %	1.4	2.1	1.1
Mean sleeping hour, hr	7.0 (1.2)	7.2 (1.2)	6.9 (1.3)
Median sleeping quality	3	4	3
Mean perceived stress scale*	5.8 (2.0)	5.8 (2.0)	5.9 (2.0)
Previous treatment of acne in the past six months with:			
Chinese medicine, %	3.3	1.7	5.3
Systemic western medicine, %	4.0	2.2	5.9
Topical western medicine, %	30.7	16.4	44.0
Intake of contraceptives in the past six months #, %	2	2	2

Data are mean (SD) unless otherwise indicated as %. PG, predominant group. *On the Perceived Stress Scale 4; #women only.

4.1.6.1. ASSOCIATION OF DIET AND ACNE

When all participants were analysed as a whole group, no food was significantly associated with the occurrence of acne However, in the yin-PG, we found that a higher intake of food from street stalls was associated with a lower likelihood of having clinical acne. In the yang-PG, higher consumption of desserts and fresh fruit juices was associated with a higher likelihood of clinical acne, whereas higher consumption of dairy or soy products was associated with a lower likelihood of clinical acne (Table IV-2).

Table IV-2 Association of foods with occurrence of acne: results of multivariate logistic regression

	All participants (n=322)			Yin-PG (n=155)			Yang-PG (n=167)		
	P	Exp (B)	95% CI	P	Exp (B)	95% CI	P	Exp (B)	95% CI
Snacks	0.67	0.88	0.50-1.56	0.80	1.16	0.35-3.83	0.19	0.57	0.25-1.31
Chocolate or candies	0.53	0.88	0.59-1.32	0.78	1.15	0.43-3.06	0.06	0.56	0.31-1.03
Dried food	0.20	1.50	0.81-2.81	0.49	1.68	0.38-7.40	0.60	1.24	0.54-2.84
"Street food" (e.g. dim sum, fish balls)	0.07	0.64	0.40-1.04	***0.04***	***0.29***	***0.09-0.94***	0.80	0.92	0.47-1.79
Dessert, ice-cream, cake, tarts	0.08	1.51	0.95-2.40	0.10	2.42	0.84-7.00	***0.04***	***2.13***	***1.03-4.73***
Soft drinks	0.23	1.02	0.99-1.05	0.25	1.10	0.94-1.26	0.37	0.79	0.47-1.32
Beverages	0.07	0.76	0.51-1.12	0.12	0.47	0.19-1.20	0.90	0.96	0.53-1.74
Fresh fruit juice	0.05	1.46	1.00-2.13	0.70	0.83	0.32-2.13	***0.02***	***1.85***	***1.09-3.13***
Fresh fruits	0.88	0.98	0.73-1.30	0.69	0.88	0.46-1.67	0.93	0.98	0.65-1.48
Vegetables	0.70	0.94	0.70-1.27	0.90	0.95	0.47-1.95	0.84	0.96	0.64-1.44
Dairy drinks or soybean milk	0.19	0.81	0.60-1.10	0.92	1.04	0.54-1.98	***0.04***	***0.65***	***0.43-0.99***

*$p<0.05$

4.1.7. DISCUSSION

Using the TCM 'individualising' concept, we found an association between acne and certain foods, in contrast to previous studies. This could be an explanation for the discrepancy between the anecdotal evidence of an association between diet and acne in clinical practice and the lack of evidence for such an association in clinical studies. In TCM, an imbalance of yin and yang is the root cause of disease occurrence and development (Zhu Wenfeng, 1995). One of the main theories about yin and yang is that 'they oppose and control each other' (Wu Dunxu, 1995); when yang entities meet yin entities (or vice versa), they balance out, whereas when yang entities meet yang entities, yang becomes excessive (the same applies to yin entities). The application of this theory explains our results. We found that in the yin-PG, a higher intake of food from street stalls was associated with a lower likelihood of having clinical acne. Such foods are generally fatty, heavily flavoured and deep-fried, and considered to be yang-rich foods (Weijian, 1992). Higher consumption of these by a yin-rich person might ameliorate their acne. In contrast, in the yang-PG, acne seemed to be more likely in people with a higher intake of desserts and fresh fruit juices, but less likely in those with a higher intake of dairy or soy products. Because of their sweet taste, desserts and fruit juices are generally yang-rich foods ("Zhong Yao", 1986) and higher consumption of them by a yang-predominant person might worsen their acne, whereas dairy or soy products are generally regarded as neutral to yin-rich foods (Weijian, 1992; "Zhong Yao", 1986) thus higher consumption of these by a yang predominant person might improve their acne. We found a significant correlation in the yang-PG group between acne and the intake of desserts and fresh fruit, but not between acne and the intake of other sugary foods such as sweets. The cause of such apparently incongruent findings is unclear. It is possible that our

participants, who are young adults at their age and have already consumed fewer 'children's foods' such as sweets. That leads to similar low consumption of sweets in both clinical acne group and reference group, as well as difficulty to detect the real acne-causing of sweets, if any, by statistical analysis. In Hong Kong many types of freash fruit juice are of high sugar content rather than pure fresh fruit juice. This would explain why consumption of fresh fruit juice might worsen their acne. One should conduct further analysis the types of fresh jucie being consumed.

Alternatively, an association between intake of sweets and the occurrence of acne might not be detectable by our analysis. This may also be a statistical artefact; correlation between these variables could explain the result because only one of the correlated variables was significant in the multivariate model.

We attempt to suggest a biologically plausible mechanism by integrating TCM and modern medicine theory. Androgen is a major pathogenic factor of acne (Wiegratz & Kuhl, 2002; Thiboutot, 2001) by stimulating sebum production or keratinisation. The two prerequisites for androgen expression are the presence of androgen and the functioning of androgen receptors (Shaw, 2002). Subjects with yang predominant body constitution, namely "excess heat" or "heat in phlegm", were found to either have higher level of androgen in serum or elevated androgen sensitivity respectively (Huang, Bai, & Huang, 2002; Tian, Zeng, & Wang, 2006). These statuses might have set the stage for the diet-induced hyperinsulinemia, which is generally accepted as a contribution to excessive secretion of androgen (Livingstone & Collison, 2002; Wang, Miura, Kaneko, Li, Oin, et al, 2002), and end up in developing acne. If someone consume dessert and fruit juice which are high in carbohydrates content and/or dietary fat, insulin resistance may increase, leading to

hyperinsulinemia and then androgen-triggered acne.

To our knowledge, this is the first study to investigate the diet–acne relationship using a TCM approach. Our results may have a practical bearing on treatment of acne from a TCM perspective. It is well known that social and cultural factors may influence the pattern of symptoms and clinical presentation (Helman, 2000), and our results suggest the possibility of an evidence-based approach to the treatment for patients with acne.

4.1.8. LIMITATIONS OF THE STUDY

There are several limitations to our study. Firstly, the association found does not necessitate a causal relationship. Further prospective studies are thus necessary to confirm if certain foods affect the severity of acne while appreciating the individualised concept. Secondly, yin-yang is the very basic principle of TCM, which is suitable enough at the level of research investigation but is too general for handling the complexity of patients' signs and symptoms presented at clinical practice. To formulate the practical dietary advice to patients of acne in future study, the application of TCM syndrome subtypes, which is the standard diagnose in routine TCM clinical practice, could be useful for transforming research evidence into practical use. Thirdly, only a brief diet questionnaire was used because the study venue could provide only a limited time to complete the research process. Further study implementing a more detailed questionnaire could be used to record a more comprehensive diet pattern.

4.1.10. SUMMARY

The application of a TCM approach led to the detection of significant associations between diet and the occurrence of acne.

4.2. RANDOMISED CONTROL TRIAL ON THE EFFECTIVENESS OF TCM-SYNDROME-TAILORED DIETARY ADVICE FOR PATIENTS WITH ACNE

Previously, we reported a cross-sectional study investigating the association of diet and occurrence of acne by categorising our study subjects into yin-predominant and yang-predominant TCM body constitution (Law, Chuh, Molinari, & Lee, 2009). Encouragingly, the results substantiated the diet-acne relationship hypothesis. However, splitting the patients into yin predominant and yang predominantly group only is too oversimplified in real-life practice. In this study, we proposed the use of a more detailed and precise TCM syndrome classification approach to categorise the subjects with four different TCM syndrome subtypes specific for acne (hereafter written as "subtype(s)") and investigate the effectiveness of the subtype-specific dietary advice. The research question was: Is TCM syndrome-tailored diet advice plus standard medical advice (intervention group) more effective than standard medical advice alone (control group) in improving clinical severity of acne in adolescents?

4.2.1. OBJECTIVE

The objective of this part of the study was to investigate if TCM syndrome-tailored diet advice plus standard medical advice (intervention group) was

more effective than standard medical advice alone (control group) in improving clinical severity of acne in adolescents.

4.2.2. OVERALL STUDY DESIGN

We conducted this assessor-blind, randomised controlled trial between November 2007 and March 2008. The researchers reached the schools and met the students at baseline visit (first visit), four weeks (second visit) and 12 weeks (final visit). At the screening visit, we recorded the baseline clinical information and checked for the students' entrance criteria. Eligible subjects would receive a personal session of diet advice plus standard medical advice in intervention group (IG), or standard medical advice alone in control group (CG) delivered by a fully registered TCM practitioner with the TCM Council of the Hong Kong government. At the following visits there was no other message delivered to either group except resolving queries raised by the subjects. We obtained the informed consent from the subjects and the subjects' guardian before they participated in the study.

4.2.2.1. CATEGORISATION OF SUBJECTS WITH DIFFERENT TCM SYNDROME SUBTYPES OF ACNE

We categorised the subjects for their TCM syndrome subtypes at the screening visit with reliable criteria. According to the national TCM guideline of the State Bureau of Technical Supervision, National Standard of People's Republic of China (State Bureau of Technical Supervision, 1997), there are four subtypes for acne,

namely "wind-heat (WH)", "damp-heat (DH)", "stagnant phlegm or blood (SPB)", and "imbalance of chong-ren (ICR) (this subtype is female exclusive)" (Table IV-3). Having taking the subjects' clinical information using the four TCM diagnostic skills of inspection for tongue or other signs, listening and smelling, inquiring, and palpation for pulse or other signs, a fully registered TCM practitioner diagnosed the subtype for each subjects.

Table IV-3 Clinical presentation of the four TCM syndrome classification of acne vulgaris according to the national TCM guideline of the State Bureau of Technical Supervision, National Standard of People's Republic of China

	Windheat	**Dampheat**	**Stagnant phelgm or blood**	**Imbalance of chongren**
Main symptoms	Mostly Comedones	Greasy skin, mostly painful papules and pustules	Cystic or nodular acne lesion, dull colour, recurrent, prone to develop scar	Any type of acne lesion, female, aggravate before menstruation
Associated symptoms	Flushed face, torrid skin, hot breath, itchy or painful acne lesion, reddish tongue at tip and edge, yellowish tongue fur, fast pulse or fast-slippery pulse	Occasionally nodular acne lesion, halitosis, constipation, brownish urine may accompanied, reddish tongue, yellowish greasy tongue fur, slippery pulse	Stagnant Blood: Relatively hard cyst, purplish tongue or with purplish petechiae. Stagnant Phlegm: Smooth and tender cyst, abdominal fullness and loose feces, slippery or greasy tongue fur, slippery pulse	Mostly found around mouth and chin, may accompany irregular menstruation, lower abdomen distension and pain, taut pulse

4.2.3. PARTICIPANTS

We recruited students from Form two to six (Grade eight to 12), aged from 11 to 21, from eight secondary schools in Hong Kong, China. We approached each school consecutively until enough subjects were recruited. Subjects were included after fulfilling the following criteria: (i) having GAGS score ≥ 4 (i.e. moderate, severe or very severe acne); (ii) belonging to any one of the four standardised subtypes. Subjects were excluded if they had any one of the following criteria: (i) having received dietary advice from other TCM practitioners for their acne problem in previous six months; (ii) having history of topical or systemic treatments in the previous six months as advised or prescribed by western medical or TCM practitioners; (iii) undergoing concurrent dietary modification for other purposes; (iv) being mentally incapable of giving informed written consent and unwilling to comply with study requirements including attending follow-up visits and filling in questionnaires.

4.2.3.1. RANDOMISATION OF SUBJECTS

We assigned all the eligible subjects within each TCM syndrome to the IG or CG according to a computer generated randomisation list using blocks of six. To conceal allocation from the investigators, an independent statistician at a separate site not involved in this study prepared the randomisation list which was sealed in opaque and sequentially-numbered envelopes.

4.2.4. INSTRUMENTS

At each of the three visits, we assessed the subjects' GAGS (Doshi et al., 1997) score. Details of the GAGS assessment was shown in Chapter *III*. Besides, subjects filled in a questionnaire consisting of demographic data and other useful measurements (Appendix 3).

4.2.4.1. FOOD FREQUENCY QUESTIONNAIRE

The validated 212-items food frequency questionnaire (Leung, Ho, Woo, Lam, & Janus, 1997) (FFQ) was used. Subjects were questioned about the consumption of the 212 items belonging to the main groups of food: (1) meat; (2) vegetables and beans; (3) fruits; (4) dairy products and beverages; (5) snacks; (6) fishes and seafood; (7) grains; and (8) eggs. Method of preparation for each of the main groups of food were also enquired, choices

included steamed, stirred fried, pan fried, deep fried, boiled, stewed, barbecued, micro-waved, and boiled over a long period of time.

For each food item, the frequency was measured in nine categories: never, a few times per year, once per month, 2-3 times per month, once per week, twice per week, 3-4 times per week, 5-6 times per week, and every day. Subjects were also asked on the amount they ate, with reference to an illustration of a coloured manual showing the standardised portion size or weight of the food.

4.2.4.2. OTHER MEASUREMENT OF THE POTENTIALS CONFOUNDING VARIABLES

Sleeping quality as measured by Pittsburg Sleeping Quality Index (PSQI)

PSQI (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) is a self-administered scale containing 15 multiple-choice items and 4 write-in items to measure sleeping quality during the previous month. Seven scores from the 19 questions would be generated and correspond to the domains of subjective sleeping quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleep medications, and daytime dysfunction. All items are brief and easy for most adolescents to understand and administer it. It covers domains include. The summation of the 19 items generates a global score ranging from 0 to 21. The higher the score is, the poorer the sleep quality is. The psychometric properties have shown it as a reliable and valid tool for clinical use.

Perceived Stressed Scale – four item version (PSS-4)

PSS-4 (Cohen et al, 1983) was also used in the cross-sectional study in Chapter *III*. In brief, PSS-4 is a four-item self-report instrument to measure the stress level of the subjects. It estimates the stress level perceived by the respondent over the past month.

Physical exercise

A question "In the past seven days, how many day(s) did you do an exercise which increases your heart and breathing rate for 60 minutes or more?" The answer choices were 0 day, 1 day, 2 day, 3 day, 4 day, 5 day, 6 day, or 7 day.

Self-medication

To capture any self-medication utilisation, a question "Did you used self-medication?" were included in the questionnaire.

Contraceptives use

Contraceptive medication used (for whatever purpose) could affect hormonal changes thus the severity of acne. Therefore, a question "Did you use any contraceptive pill for whatever purpose?" was also asked in the questionnaire.

Parents' confidence in administering the dietary advice

In view of the young age of our subjects, we assume their diet are usually prepared by parents whose confidence in administering our dietary advice would therefore be a crucial confounder in our outcome measurement.

Hence, a question "Do you have confidence in preparing the diet according to our dietary advice given to your children?" was asked before the study started.

4.2.5. TREATMENTS

4.2.5.1. TCM-SYNDROME-TAILORED DIETARY ADVICE DELIVERED TO INTERVENTION GROUP

Only the IG received the dietary intervention (Table IV-4). We believe students would respond best to a single message focusing on the proscription of food rather than additional food consumption or the combination of both. The synthesis of the TCM syndrome-tailored diet advice involved four steps: preparation and drafting step, formulation step, validation step, and evaluation step.

In the first step, we captured the specific food items to be proscribed for each subtype from TCM nutrition books and the core journals from "China Academic Journals full-text database". We verified the validity of the information from "A Dictionary of Chinese Medicine" (the primary reference) ("Zhong Yao", 1986) or "Compendium of Materia Medica" (the secondary reference) (Li, 1578). Draft of dietary advice plans (food lists of proscription) for each TCM acne syndrome were then prepared. In the second step, we supplied the dietary advice plan to a focus group composing of three other registered TCM practitioners. The principal author chaired the focus group and discussion, made record of the discussion, and revised the

dietary plan according to their comments. In the third step, we presented the revised dietary advice plan to three eminent TCM professors. If they approved the entire dietary advice plan, we would adopt this version as the final version. If they recommend any insertion, deletion, or amendment, such advice would be discussed again within the original focus group, with the insertion, deletion or amendment incorporated or not incorporated. We then presented the revised version to the three professors again. We repeated this cycle until all members of the focus group and all the three professors approved all and singly of parts of the dietary advice plan. In the final step, we invited three adolescents to comment on the readability, clarity, styles, and relevance to their culture of the dietary advice plan. We did not further revise the content of the dietary advice plan at this stage. The finalised dietary advice plan was then edited in a reader-friendly style composing of minimal TCM jargons.

Table IV-4 Synopsis of the dietary advice for each of the four TCM syndrome subtypes

TCM syndrome subtypes	**Food on Proscription List**
Windheat	Poultry, meat and seafoods: Chicken, goose, lamb, beef, crab, shrimp, lobster, fish without scales Vegetables and Fruits: Chinese chives, bamboo shoots,. Lai-chee, longan, durian, mango, peach, pineapple Snacks and beverages: Crispy snacks (e.g. potato chips, French fries, biscuits), chocolate, coffee, wine Others: Heavy-favoured foods (e.g. foods with too much seasonings, preserved food), greasy food (e.g. fatty meat, butter, poultry or animal skin), spicy food (e.g. curry, mustard, satay, ginger, garlic), food which is pan-fried, deep-fried, fried, grilled, baked or stewed
Dampheat	Poultry, meat and seafoods: Chicken, goose, lamb, beef, crab, shrimp, lobster, fish without scales Vegetables and Fruits: Chinese chives, bamboo shoots,. Lai-chee, longan, durian, mango, peach, pineapple Snacks and beverages: Crispy snacks (e.g. potato chips, French fries, biscuits), sugary food, chocolate, coffee, wine Others: Heavy-favoured foods (e.g. foods with too much seasonings, preserved food), greasy food (e.g. fatty meat, butter, poultry or animal skin), spicy food (e.g. curry, mustard, satay, ginger, garlic), food which is pan-fried, deep-fried, fried, grilled, baked or stewed
Stagnant phelgm or blood	Poutry, meat and seafoods: Goose, beef, lamb, shrimp, crab, lobster, fish without scales Vegetables and Fruits: Bamboo shoots, mango, peach, pineapple Snacks: Sugary food Others: Heavy-favoured foods (e.g. foods with too much seasonings, preserved food), greasy food (e.g. fatty meat, butter, poultry or animal skin), spicy food (e.g. curry, mustard, satay, ginger, garlic), food which is pan-fried, deep-fried, fried, grilled, baked or stewed

Imbalance of chongren	Poutry, meat and seafoods: Goose, beef, lamb, shrimp, crab, lobster Others: Heavy-favoured foods (e.g. foods with too much seasonings, preserved food), greasy food (e.g. fatty meat, butter, poultry or animal skin), spicy food (e.g. curry, mustard, satay, ginger, garlic)

4.2.5.2. STANDARD MEDICAL ADVICE DELIVERED TO BOTH INTERVENTION GROUP AND CONTROL GROUP

Both the IG and CG received standard medical advice. The construction of standard medical advice consisted of three steps: preparation and drafting step, validation step, and evaluation step. In the first step, we derived the content of standard medical advice from extensive literature review regarding the existing evidence of the association of lifestyle and acne. Searches were made in the MEDLINE, EMBASE, AMED, Cochrane and DARE databases. The standard medical advice was drafted accordingly. In the second step, we presented the draft to a specialist dermatologist and sought for his endorsement. If he approved the standard medical advice, we would adopt this version as the final version. If he recommended any insertion, deletion, or amendment, such advice would be incorporated or not incorporated. The content of the standard medical advice was amended until he approved all parts. In the last step, the standard medical advice plan was edited in a reader-friendly style composing by minimal medical jargons, but the content was not revised. We invited three adolescents to comment on the

readability, clarity, styles, and relevance to their culture of the dietary advice plan.

The contents are shown in Table IV-5.

Table IV-5 Standard medical advice given to all subjects

1	Prevent and relieve your stress not only improve your general well-being, but may help your acne as well
2	Protect your skin and reduce the harmful effects of sunlight. Administer effective sunlight protection measure when doing outdoor activities (even in sheltered places)
3	Avoid smoking
4	Do not wash your face too frequently. For the majority of patients with acne, wash your face twice a day (once in the morning and once at night) unless your doctors otherwise recommend. Use moisturising agents only if must
5	Can use cosmetics when needed unless the particular cosmetics incur you irritant contact dermatitis. Some cosmetic agents may actually induce or exacerbate acne. Hence, better to avoid those ones which you have not used earlier especially with oily bases; and
6	Bleaching and facials may exacerbate acne in some patients, should be warned

4.2.6. OUTCOME MEASUREMENT

We examined all consenting students with the GAGS which is a clinical grading system for the severity of acne. A systematically trained and validated rater of GAGS (a research nurse), who was blind to the group allocation, scored all the study subjects' clinical severity of acne at all visits. The primary efficacy endpoint was defined as a percentage change of clinical severity of acne indicated by GAGS. The schedule for the study procedure and the collection of dat is shown in Table IV-6.

Table IV-6 Study scheme of the randomised controlled trial

Period	**Screening**	**Intervention**		
Visit	1	1	2	3
Week	0	0	4	12
Administration and intervention				
Review of incl./ excl. criteria	X			
Informed consent[a]	X			
Randomisation	X			
Provide TCM syndrome-tailored dietary advice for intervention group		X		
Provide standard medical advice for intervention group and control group		X		
Resolve queries as raised by subjects			X	X
Medical and Other data collection				
Medical history	X			
Collect demographic data (e.g. age, height, weight, etc)	X			
Collect dietary pattern with a dietary frequency questionnaire		X	X	X
GAGS score		X	X	X
CADI score		X	X	X
Adverse events reported[b]			X	X

[a] Informed consent must be obtained before any study-related procedures are performed.

[b] Subjects entered the study will be provided with a diary for records.

4.2.7. SAMPLE SIZE ESTIMATION

We estimated the sample size according to a previous study using GAGS as outcome measure to investigate the effect of topical gel for mild to moderate acne. We considered the effect of dietary advice was half as effective as that of the topical treatment (Weiss, Shavin, & Davis, 2002), and the minimal clinical significant difference we expected was 3.85. In Chapter *III*, we utilised GAGS for the prevalence of acne in Chinese population showed an estimated standard deviation at 4. According to the following formula (Pagano & Gauvreau, 2000):

$$N = 4\sigma^2 (Z_{crit} + Z_{pwr})^2 / D^2$$
$$N = 4 (4)^2 (1.96 + 1.282)^2 / (3.85)^2$$
$$N = 48$$

where Zcrit is the standard normal deviate corresponding to selected significance criteria at 5% (two sided), Zpwr is the standard normal deviate corresponding to selected power of 90%, σ is the standard deviation, and D is the minimum clinical significant difference between the two means. It is estimated at least 48 subjects for each TCM syndrome should be recruited (24 for IG and 24 for CG). To prepare an attrition rate at 20%, a sample size of 60 subjects for each TCM syndrome (30 subjects for each group of each subtype) was needed to yield a power of 90% with the type one error set at 5%. Although we finally did not make up the sample size of 30 for ICR subtype, we managed to retain enough subjects (n=26 for IG, and n=25 for CG) for the primary analysis at the end of study.

4.2.8. STATISTICAL ANALYSIS

Independent sample t-test was used for comparing the means of continuous variables between IG and CG if appropriate. Categorical data were tested by chi-square test. We compared the percentage change of GAGS over the study period (baseline, 4^{th} week, and 12^{th} week). The primary analysis was to compare the percentage change of GAGS from baseline to 12^{th} week between the groups using analysis of covariance (ANCOVA) for each TCM syndrome, controlling for the variation in the dependent variable due to gender, age, BMI, schools, physical exercise, medication use, female contraceptive use, stress level, parents' confidence, and sleeping quality We performed ANCOVA (one for each subtype) to evaluate the percentage change in GAGS from baseline to week 12 between the groups. Other outcomes included CADI and self-perceived severity. All of the analyses were based on assigned intervention at the time of randomisation, regardless of adherence or compliance status (i.e. intent to treat analysis). All analyses were performed on SPSS 13.0.

4.2.9. RESULTS

4.2.9.1. RESPONSE AND PARTICIPATION OF SUBJECTS

A total of 2241 subjects were initially invited, 647 were screened for eligibility, and 235 subjects (60 for WH, 60 for DH subtype, 60 for SPB subtype, and 55 for ICR subtype) were randomised into IG and CG, with a preparation of attrition rate at 20% (Figure IV-1).

4.2.9.2. (BASELINE) CHARACTERISTICS OF SUBJECTS

Patients' characteristics at baseline were similar in IG and CG across the four subtypes (Table IV-7). School A to G were co-educational schools. In the third quartile of the school year, we still failed to recruit enough subjects for the ICR subtype which is exclusively for female. School H is a girl school and was deliberately chosen so that female could be recruited in the most effective way.

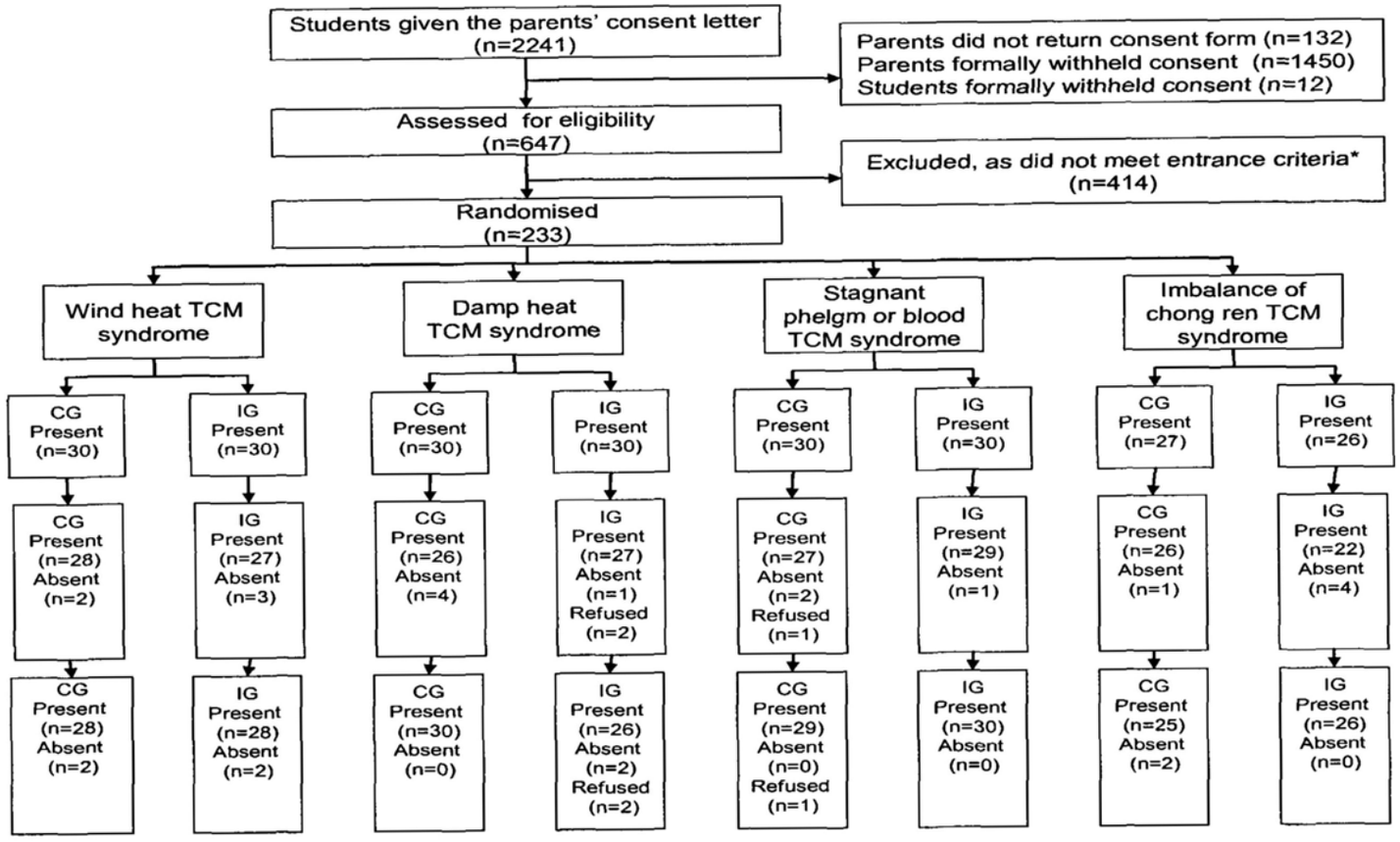

Figure IV-1 Flow chart of subjects over 12 weeks' study period

Table IV-7 Baseline characteristics of subject with respect to the four TCM syndrome subtypes

	Windheat		Dampheat		Stagnant Phelgm or Blood		Imbalance of Chongren[◊]	
	IG (N=30)	CG (N=30)	IG (N=30)	CG (N=30)	IG (N=30)	CG (N=30)	IG (N=26)	CG (N=27)
Male (%)	15 (50.0)	18 (60.0)	17 (56.7)	18 (60.0)	13 (43.3)	21 (70.0)	0 (0)	0 (0)
Mean Age (SD)	15.4 (1.33)	15.2 (1.54)	15.6 (1.63)	15.4 (1.28)	15.2 (2.05)	15.0 (1.67)	15.7 (1.59)	15.8 (1.80)
Mean BMI (SD)	18.8 (1.91)	19.6 (4.14)	19.6 (2.55)	20.4 (4.18)	20.1 (2.86)	19.6 (2.45)	20.0 (4.52)	20.0 (7.01)
Mean GAGS (SD)	16.1 (3.35)	17.0 (2.88)	20.2 (3.40)	18.7 (2.98)	18.7 (3.75)	19.5 (4.15)	18.3 (3.04)	17.3 (2.99)
School								
A (%)	6 (20.0)	9 (28.1)	11 (36.7)	4 (12.9)	1 (3.4)	2 (6.7)	3 (11.5)	1 (3.7)
B (%)	6 (20.0)	4 (12.5)	4 (13.3)	2 (6.5)	2 (6.9)	1 (3.3)	2 (7.7)	3 (11.1)
C (%)	5 (16.7)	4 (12.5)	6 (20.0)	5 (16.1)	6 (20.7)	8 (26.7)	4 (15.4)	3 (11.1)
D (%)	4 (13.3)	5 (15.6)	1 (3.3)	6 (19.4)	2 (6.9)	7 (23.3)	2 (7.7)	4 (14.8)
E (%)	5 (16.7)	5 (15.6)	4 (13.3)	3 (9.7)	3 (10.3)	0 (0)	2 (7.7)	0 (0)
F (%)	4 (13.3)	2 (6.3)	3 (10.0)	6 (19.4)	4 (13.8)	3 (10.0)	3 (11.5)	2 (7.4)
G (%)	0 (0)	3 (9.4)	1 (3.3)	5 (16.1)	2 (6.9)	4 (13.3)	3 (11.5)	4 (14.8)
H[#] (%)	0 (0)	0 (0)	0 (0)	0 (0)	9 (31.0)	5 (16.7)	7 (26.9)	10 (37.0)

[◊] This TCM syndrome is female exclusive

[#] School H is a girl school

Compliance was determined by the reduction of the food intake that the subjects of IG were advised to avoid. Compliance rate was calculated as: (number of food the subjects did avoid consumption) / (total number of food we advised to avoid consumption) x 100%. The compliance rates for WH, DH, SPB and ICR subtypes were 59.1%, 70%, 73%, and 78% respectively.

4.2.9.3. EFFICACY OF TCM-SYNDROME-TAILORED DIETARY ADVICE

Table IV-8 shows the crude results of the outcomes during the study, without adjustment for gender, age, BMI, schools, physical exercise, medication use, female contraceptive use, stress level, parents' confidence, and sleeping quality and without dividing the subjects into the four different TCM syndrome subtypes. No significant difference was found between IG and CG in GAGS score, CADI score, and self-perceived severity after four weeks and 12 weeks.

Table IV-9, Table IV-10, Table IV-11, and Table IV-12 demonstrate the unadjusted results of all outcome measurements with respect to each of the four TCM syndromes. No significant difference in all measurements were found between the IG and CG during the course of the study.

Figure IV-2 demonstrated the results after adjustment for all subjects but without dividing the subjects into the four TCM syndromes. There was a greater improvement of GAGS (the primary outcome) in IG than CG, but the difference was not significant.

Table IV-13, Table IV-14, and Table IV-15 showed the change of GAGS score, CADI score, and self-perceived severity respectively during the study period. They were both adjusted for the confounding factors and divided into different TCM syndrome subtypes. There was a significant improvement of GAGS score in IG than that in CG (-11.5% vs 1.5%; p=0.041) (Figure IV-3). In the other three subtypes, there were no more significant improvements of acne severity in IG than that in CG. There were no significant differences between IG and CG in CADI and self-perceived severity.

Table IV-8 Unadjusted results of the intervention of TCM syndrome tailored dietary manipulation as measured by the major outcomes without dividing the subjects according to the TCM syndrome subtype

	Intervention			**Control**		
	Baseline	4 wks	12 wks	Baseline	4 wks	12 weeks
Total GAGS (SD)	18.3 (3.7)	17.6 (3.9)	17.5 (4.9)	18.1 (3.4)	17.5 (3.7)	17.2 (4.4)
%GAGS change (SD)		-2.8 (17.8)	-3.1 (25.2)		-2.0 (20.4)	-3.3 (25.8)
Total CADI (SD)	4.5 (2.7)	4.2 (2.8)	4.2 (2.9)	3.5 (2.3)	3.4 (2.3)	3.2 (2.5)
%CADI change (SD)		0.7 (75.8)	3.1 (92.5)		3.4 (55.4)	-5.7 (80.4)
CADI Q1	1.0 (0.7)	0.8 (0.7)	0.8 (0.7)	0.7 (0.7)	0.6 (0.6)	0.5 (0.6)
CADI Q2	0.6 (0.8)	0.6 (0.8)	0.6 (0.8)	0.4 (0.6)	0.3 (0.5)	0.4 (0.7)
CADI Q3	0.2 (0.6)	0.3 (0.7)	0.3 (0.7)	0.1 (0.5)	0.2 (0.6)	0.2 (0.7)
CADI Q4	1.2 (0.8)	1.2 (0.7)	1.2 (0.8)	1.0 (0.7)	1.0 (0.7)	0.9 (0.7)
CADI Q5	1.6 (0.7)	1.4 (0.7)	1.4 (0.8)	1.3 (0.7)	1.3 (0.7)	1.1 (0.7)
Self-perceived severity (SD)	5.3 (1.3)	5.2 (1.6)	5.2 (1.8)	5.1 (1.6)	4.9 (1.7)	4.7 (1.7)
% change (SD)		0.7 (31.1)	1.2 (35.8)		3.8 (47.7)	-2.0 (43.7)

Table IV-9 Unadjusted results of the intervention of TCM syndrome tailored dietary manipulation as measured by the major outcomes in the Windheat TCM syndrome subtype

	Intervention			**Control**		
	Baseline	4 wks	12 wks	Baseline	4 wks	12 weeks
Total GAGS (SD)	16.1 (3.4)	15.8 (3.6)	16.2 (5.0)	17.0 (2.9)	16.8 (2.8)	16.2 (3.5)
% GAGS change (SD)		+0.4 (24.6)	+3.2 (33.2)		+1.2 (22.0)	-0.2 (25.0)
Total CADI (SD)	3.8 (2.5)	3.5 (2.1)	3.5 (2.3)	2.9 (2.3)	2.8 (2.4)	2.2 (2.0)
% CADI change (SD)		-5.1 (32.7)	-3.2 (51.4)		+8.7 (64.5)	-20.3 (57.3)
CADI Q1	0.8 (0.7)	0.6 (0.6)	0.7 (0.6)	0.6 (0.7)	0.6 (0.7)	0.5 (0.6)
CADI Q2	0.5 (0.7)	0.4 (0.6)	0.5 (0.6)	0.3 (0.5)	0.3 (0.4)	0.2 (0.4)
CADI Q3	0.1 (0.4)	0 (0.2)	0 (0.2)	0.1 (0.2)	0.2 (0.6)	0.2 (0.6)
CADI Q4	1.0 (0.7)	1.2 (0.7)	1.0 (0.7)	0.8 (0.7)	0.8 (0.6)	0.7 (0.6)
CADI Q5	1.4 (0.7)	1.3 (0.7)	1.3 (0.8)	1.1 (0.8)	1.0 (0.6)	1.0 (0.6)
Self-perceived severity (SD)	4.7 (1.2)	4.8 (1.4)	5.0 (2.0)	4.7 (1.6)	4.3 (1.5)	3.9 (1.2)
% change (SD)		+6.8 (29.8)	+9.3 (41.4)		-6.2 (38.5)	-13.1 (33.6)

Table IV-10 Unadjusted results of the intervention of TCM syndrome tailored dietary manipulation as measured by the major outcomes in the Dampheat TCM syndrome subtype

	Intervention			Control		
	Baseline	4 wks	12 wks	Baseline	4 wks	12 weeks
Total GAGS (SD)	20.2 (3.4)	19.4 (4.1)	19.1 (4.0)	18.7 (3.0)	18.0 (3.6)	16.9 (4.5)
%GAGS (SD)		-3.7 (14.3)	-4.5 (16.1)		-2.5 (20.1)	-8.6 (26.1)
Total CADI (SD)	4.6 (3.0)	4.5 (3.5)	4.5 (3.2)	3.5 (1.5)	3.3 (1.8)	2.8 (1.8)
%CADI (SD)		+13.8 (124.6)	+29.6 (153.4)		-3.9 (57.6)	+16.8 (50.6)
CADI Q1	0.8 (0.7)	0.6 (0.6)	0.7 (0.6)	0.6 (0.7)	0.6 (0.7)	0.5 (0.6
CADI Q2	0.7 (0.9)	0.7 (0.9)	0.7 (0.9)	0.4 (0.5)	0.3 (0.4)	0.3 (0.5)
CADI Q3	0.3 (0.7)	0.4 (0.8)	0.4 (0.8)	0 (0.2)	0.1 (0.2)	0.1 (0.4)
CADI Q4	1.1 (0.8)	1.1 (0.9)	1.1 (0.8)	1.1 (0.6)	1.1 (0.7)	0.8 (0.6)
CADI Q5	1.5 (0.7)	1.4 (0.9)	1.3 (0.9)	1.5 (0.6)	1.5 (0.8)	1.0 (0.6)
Self-perceived severity (SD)	5.6 (1.2)	5.6 (1.5)	5.4 (1.7)	4.7 (1.6)	4.6 (1.5)	4.7 (1.7)
% change (SD)		-0.9 (28.6)	-1.6 (30.7)		+23.0 (68.9)	+11.1 (59.1)

Table IV-11 Unadjusted results of the intervention of TCM syndrome tailored dietary manipulation as measured by the major outcomes in the Stagnant Phelgm or Blood TCM syndrome subtype

	Intervention			**Control**		
	Baseline	4 wks	12 wks	Baseline	4 wks	12 weeks
Total GAGS (SD)	18.7 (3.8)	18.0 (3.8)	17.8 (5.3)	19.5 (4.2)	18.9 (4.1)	19.0 (5.2)
%GAGS (SD)		-2.8 (18.0)	-4.1 (25.2)		-1.6 (20.1)	0.5 (30.8)
Total CADI (SD)	4.0 (2.4)	3.8 (2.7)	3.6 (2.7)	4.2 (2.9)	4 (2.6)	4.1 (3.4)
%CADI (SD)		+2.1 (68.8)	-9.5 (70.3)		+7.7 (55.9)	+13.1 (126.8)
CADI Q1	0.8 (0.7)	0.6 (0.5)	0.6 (0.6)	0.8 (0.7)	0.7 (0.7)	0.5 (0.7)
CADI Q2	0.5 (0.8)	0.5 (0.9)	0.5 (0.8)	0.5 (0.7)	0.4 (0.6)	0.6 (0.9)
CADI Q3	0 (0.2)	0.3 (0.6)	0.2 (0.5)	0.4 (1.0)	0.3 (0.8)	0.4 (1.0)
CADI Q4	1.2 (0.8)	1.0 (0.6)	1.1 (0.8)	1.0 (0.7)	1.0 (0.7)	1.1 (0.7)
CADI Q5	1.5 (0.7)	1.4 (0.9)	1.3 (0.9)	1.5 (0.6)	1.5 (0.8)	1.5 (0.9)
Self-perceived severity (SD)	5.5 (1.6)	5.3 (1.7)	5.3 (1.7)	5.6 (1.5)	5.8 (1.7)	5.4 (1.9)
% change (SD)		-6.1 (29.7)	-0.9 (30.5)		+1.0 (33.0)	+0.4 (38.1)

Table IV-12 Unadjusted results of the intervention of TCM syndrome tailored dietary manipulation as measured by the major outcomes in the Imbalance of Chong-ren TCM syndrome subtype

	Intervention			**Control**		
	Baseline	4 wks	12 wks	Baseline	4 wks	12 weeks
Total GAGS (SD)	18.3 (3.0)	17.2 (3.0)	16.9 (4.9)	17.3 (3.0)	16.2 (3.8)	16.8 (3.9)
%GAGS (SD)		-5.6 (11.2)	-7.5 (23.4)		-5.9 (19.3)	-2.5 (20.3)
Total CADI (SD)	5.9 (2.6)	5.2 (2.8)	5.4 (3.0)	3.6 (2.3)	3.5 (2.2)	3.7 (2.3)
%CADI (SD)		-9.2 (35.9)	-6.2 (44.1)		+1.2 (40.7)	+1.9 (52.8)
CADI Q1	1.3 (0.8)	1.1 (0.9)	1.2 (0.7)	0.6 (0.6)	0.8 (0.6)	0.7 (0.6)
CADI Q2	0.8 (0.8)	0.7 (0.7)	0.7 (0.7)	0.5 (0.6)	0.4 (0.6)	0.6 (0.6)
CADI Q3	0.4 (0.9)	0.4 (0.9)	0.5 (1.0)	0.1 (0.3)	0.2 (0.4)	0.1 (0.4)
CADI Q4	1.5 (0.8)	1.5 (0.6)	1.5 (0.8)	1.1 (0.8)	1.0 (0.8)	1.1 (0.7)
CADI Q5	1.8 (0.5)	1.5 (0.6)	1.6 (0.7)	1.3 (0.7)	1.2 (0.7)	1.2 (0.6)
Self-perceived severity (SD)	5.3 (1.3)	5.2 (1.7)	4.9 (1.7)	5.4 (1.6)	4.9 (1.8)	4.9 (1.8)
% change (SD)		+2.9 (36.7)	-2.8 (40.1)		-3.1 (36.4)	-6.7 (36.6)

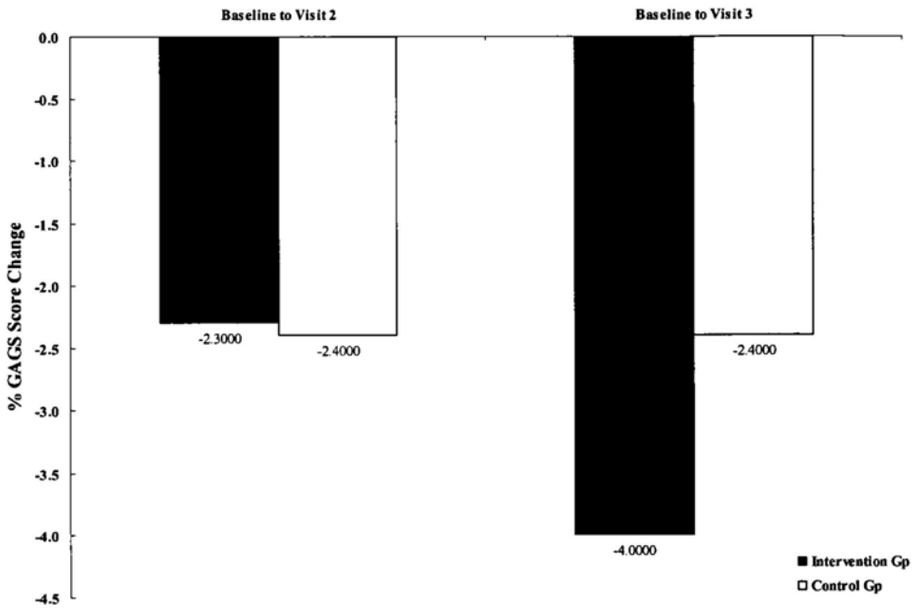

Figure IV-2 Comparison of the percentage change of GAGS score between intervention group and control group without dividing subjects according to their TCM syndrome subtypes

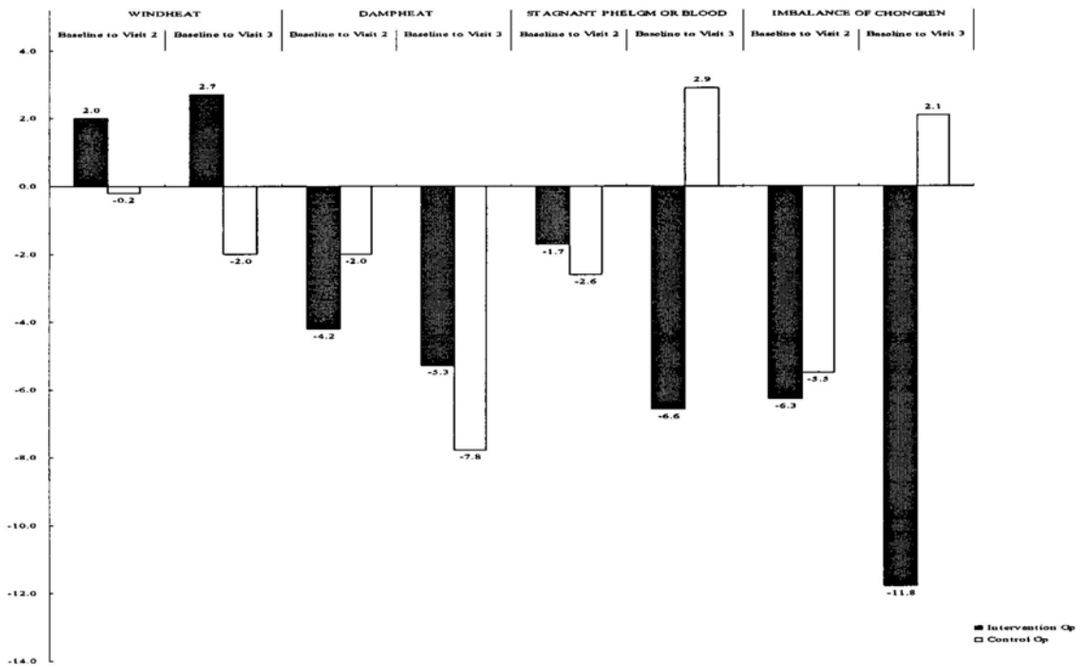

Figure IV-3 Comparison of the percentage change of GAGS score between intervention group and control group with respect to the different four TCM syndrome subtypes

Table IV-13 Primary outcome analysis (clinical severity of acne) after adjustment during the study period

		GAGS score			
TCM syndrome	**Study group**	% Change from baseline to week 4# (SE)	% Mean difference (IG-CG)#	% Change from baseline to week 12# (SE)	% Mean difference (IG-CG)#
All subjects	IG (n=116)	-2.3 (1.8)	+0.2 (p=0.93)	-4.1	-1.9 (p=0.58)
	CG (n=117)	-2.5 (1.8)		-2.2	
Windheat	IG (n=30)	+2.0 (4.4)	+2.2 (p=0.73)	+2.7 (4.9)	+4.7 (p=0.51)
	CG (n=30)	-0.2 (4.2)		-2.0 (4.7)	
Dampheat	IG (n=30)	-4.2 (3.7)	-2.3 (p=0.70)	-5.3 (4.4)	+2.5 (p=0.72)
	CG (n=30)	-2.0 (3.6)		-7.8 (4.3)	
Stagnant phlegm or blood	IG (n=30)	-1.7 (3.9)	+0.8 (p=0.89)	-6.6 (5.5)	-9.5 (p=0.26)
	CG (n=30)	-2.6 (3.8)		+2.9 (5.4)	
Imbalance of chongren	IG (n=26)	-6.3 (3.0)	-0.8 (p=0.87)	-11.8 (4.3)	-14.0 (p=0.046*)
	CG (n=27)	-5.5 (3.0)		+2.1 (4.4)	

Adjusted for gender, age, BMI, schools, baseline GAGS, physical exercise, and female contraceptive use

Table IV-14 Outcome analysis (quality of life affected by acne) after adjustment during the study period

		CADI score			
TCM syndrome	**Study group**	% Change from baseline to week 4# (SE)	% Mean difference (IG-CG)#	% Change from baseline to week 12# (SE)	% Mean difference (IG-CG)#
All subjects	IG (n=116)	+2.4 (6.5)	+0.9 (p=0.92)	+5.8 (8.5)	+14.6 (p=0.24)
	CG (n=117)	+1.5 (6.7)		-8.8 (8.5)	
Windheat	IG (n=30)	-6.4 (10.3)	-16.6 (p=0.29)	-3.1 (12)	+17.3 (p=0.34)
	CG (n=30)	+10.1 (10.5)		-20.4 (12.2)	
Dampheat	IG (n=30)	+17.1(21.1)	+23.9 (p=0.46)	+34.4 (24.5)	+55.8 (p=0.14)
	CG (n=30)	-6.9 (20.2)		-21.4 (23.6)	
Stagnant phlegm or blood	IG (n=30)	+5.6 (13.8)	+1.1 (p=0.96)	+11.7 (22.0)	+18.4 (p=0.58)
	CG (n=30)	+4.4 (13.2)		-6.7 (21.1)	
Imbalance of chongren	IG (n=26)	-14.8 (9.2)	-21.7 (p=0.17)	-12..0 (11.3)	-19.9 (p=0..30)
	CG (n=27)	+7.0 (10.3)		+7.9 (12.6)	

Adjusted for gender, age, BMI, schools, baseline GAGS, physical exercise, and female contraceptive use

Table IV-15 Outcome analysis (self-perceived acne severity) after adjustment during the study period

		Self-perceived severity			
TCM syndrome	**Study group**	% Change from baseline to week 4# (SE)	% Mean difference (IG-CG)#	% Change from baseline to week 12# (SE)	% Mean difference (IG-CG)#
All subjects	IG (n=116)	+4.5 (3.0)	+1.0 (p=0.81)	+0.8 (3.9)	-2.6 (p=065)
	CG (n=117)	+3.5 (2.9)		+3.4 (3.8)	
Windheat	IG (n=30)	+10.1 (5.3)	+15.3 (p=0.05)	+9.2 (5.7)	+17.6 (p=0.73)
	CG (n=30)	-5.2 (5.2)		-8.4 (6.8)	
Dampheat	IG (n=30)	-0.6 (6.9)	-14.7 (p=0.18)	-3.3 (11.3)	-28.7 (p=0.11)
	CG (n=30)	+14.1 (6.8)		+25.4 (11.0)	
Stagnant phlegm or blood	IG (n=30)	+9.0 (7.4)	+1.1 (p=0.92)	-3.8 (6.7)	-2.6 (p=0.80)
	CG (n=30)	+7.9 (7.2)		-1.2 (6.5)	
Imbalance of chongren	IG (n=26)	-4.6 (5.7)	-4.8 (p=0.59)	-0.3 (7.0)	+1.3 (p=0..91)
	CG (n=27)	+0.2 (5.7)		-1.6 (7.0)	

Adjusted for gender, age, BMI, schools, baseline GAGS, physical exercise, and female contraceptive use

4.2.10. DISCUSSION

Over 12 weeks, patients with ICR subtype followed dietary advice in IG showed significant reduction in clinical severity of acne compared patients who received standard medical advice alone in CG. The benefits are not likely to be attributable to other individual differences because they were adjusted for in the analysis. Patients with WH, DH, and SPB subtypes received dietary advice in IG, however, did not demonstrate significant improvement in clinical severity of acne compared to patients in CG. The present study is by far the first randomised controlled clinical trial of personalised dietary manipulation in patients with acne vulgaris. Its significances lie in the affirmation of the dietary role in improving acne using a strict research protocol with a full adherence to TCM diagnostic process, as well as the addition of evidence to the growing body of knowledge regarding diet-acne relationship. The strengths of our study are well-validated measure of primary outcome (GAGS), high consistency of outcome measurements performed by the same qualified assessors, high follow-up rates (93% in WH subtype, 93% in DH subtype, 98% in SPB, and 96% in ICR), and safety (no adverse events reported).

ICR is the only subtype demonstrating the effectiveness of dietary modification. The improvement was defined by objective assessment (GAGS), but not subjective feelings of QOL affected (CADI) or self-reported severity. The improvement in ICR subtype was not likely because of the high adherence rate. Although the compliance rate was the

highest in ICR group (78%), the compliance rate of SPB (73%) and DH (70%) groups were not far lower then ICR. From TCM perspective, ICR implies the discordance of the functions of the Chong channel and Ren channel. Physiologically, the Chong channel congregates all the yin and yang meridians of organs and is called the "sea of blood"; while the Ren channel governs all the yin essence (e.g. blood, mucus, fluid, etc) and is called the sea of yin channels. Oftentimes, the failure of their coordination results in disharmonised environment, giving rise to various menstruation-associated disorders – the typical dermatological presentation is the chronic low-grade acne, usually cystic, affecting the lower face or neck, and flaring up before or during menstruation. ICR is the only subtype resulted entirely from the actions of internal pathogenic factors including diet, emotions, and physical work; whilst the other three subtypes are more relevant to external ones or combination with internal ones. Dietary manipulation helps to attain internal homeostasis directly and effectively, and therefore exerts the most prominent effect in ICR subtype only.

It is notable that there is a large resemblance of the clinical presentation of the acne between ICR subtype and the typical menstrual acneiform lesions. They both correlate closely with menstruation and develop along the jawline, chin, or neck area (Table IV-3). Combining with the facts that menstruation-related type of acne responds well to hormonal therapy and positive therapeutic effect was found only in ICR subtype, we postulate that the ICR subtype is suggestive of heightened androgenic response and dietary manipulation has generated similar effect that would have been produced by hormonal therapy. In other words, the prior heightened androgenic response

existing only amongst patients with ICR subtype may have been suppressed by dietary manipulation. Our postulation is supported by recent studies that explore the objective indicators for ICR. Higher level of testosterone in patients with acne has been shown to be associated with the diagnosis of ICR (Liu, Ma, & Li, 2003; Ji & Zhang, 2007; Hu & Chen, 2004), although contrary results were also demonstrated (Lou et al, 2005; Que, Que, & Deng, 2001). Being the first to look into the TCM-tailored dietary modification, we failed to find any direct evidence showing its androgen-opposing action in the existing literature. Nevertheless, hormonal changes in the pathogenesis of acne triggered by other types of diets have been being reported in recent years. In a cross-sectional study, subjects consuming a primitive diet consisting of low-glycaemic-load carbohydrates were found to have lower acne incidence (Cordain et al, 2002). In a randomised control trial, significant improvement in acne symptoms and reduced free androgen index were found in subjects administering a low-glycaemic-load diet compared to the controls consuming a high-glycaemic-load diet (Smith et al, 2007). In another observational study, however, no significant difference was found between patients with acne and control subjects in dietary glycaemic index or glycaemic load (Kaymak et al, 2007). Consumption of whole and skimmed milk related with hormonal constituents and endocrine changes were also associated with increased likelihood of acne as reported in two prospective cohort studies (Adebamowo et al, 2005; Adebamowo et al, 2008). Ever since, intensive discussions and commentaries have been sparkled (Lou et al, 2005; Que et al, 2001).

In view of the acne-lessening ability in the patients with ICR subtype,

dietary manipulation is of potential value to those with hormonally driven acne. Firstly, though not a perfect mono-therapy perhaps, dietary manipulation might be considered as an effective adjunct to conventional therapy and thus enhance the therapeutic effect. The combined efficacy might also antedate the effect of low-dose oral contraceptives (OC) therapy for acne when applied alone. This could help patients to get through the untoward side-effects of high estrogen level and to adhere to the OC treatment schedule. Secondly, TCM-syndrome diet manipulation could be considered as the substitute for OC treatment of acne for those have contraindications, such as having got or wanting to get pregnant, risk factors for arterial occlusive events (including stroke, heart diseases, or deep venous thrombosis), history of migraine headaches with focal neurological symptoms, heavy smokers older than 35 years. For example, patients who are with nodulocystic acne related to premenstrual syndrome, unresponsive to topical solutions, reluctant to commence isotretinoin, and thence would have been benefited from OC therapy are good candidates for dietary manipulation.

In light of the growing popularity of TCM worldwide and the paradigm shift towards the acceptance of evidence based medicine (EBM) nowadays, the utilisation of TCM-based dietary modification has to stand the test of EBM. It is well-known that social and cultural factors are influential to the pattern of symptomatology and phenomenology (Helman, 2000) and Food therapy is habitually practiced amongst Chinese population (Koo, 1984). The incorporation of dietary manipulation, as a safe and cost-free non-pharmacological intervention, into the routine acne management is

therefore highly desirable from either clinical or EBM perspective.

4.2.11. LIMITATIONS OF THE STUDY

There are a few limitations in the study. Firstly, inaccurate self-reporting, usually under-reporting in adolescents (Livingstone & Robson, 2000), of dietary intake might have taken place. Provided that guardians' consent have been obtained, further study can be performed in settings such as boarding schools where the subjects' meals are prepared in advance and their consumption of food are comparatively restrictive and controllable. Secondly, we could not completely preclude the "teaching" and "learning" between the IG and CG. We avoided this effect by not disclosing the TCM syndrome to the subjects and emphasised the futility of manipulation of diet without knowing one's own TCM syndrome. The CG was advised to maintain the routine diet habits. Thirdly, TCM diagnostic skills are required for the application of current study's results. Further research to develop a more user-friendly diagnostic instrument for the non-TCM health care practitioners is crucial for wider use. A deeper investigative comparison of the biological mechanism of and dietary influence on hormonally driven acne and ICR subtype of acne as discussed may help to bridge the gap.

4.2.12. SUMMARY

The results of this part of the study suggests that TCM syndrome-tailored

diet advice plus standard medical advice was more effective than standard medical advice alone in improving clinical severity of acne in patients with ICR subtype. The effectiveness was however not found in patients with WH, DH, and SPB subtypes.

Chapter V CONCLUSION

Acne vulgaris is a common skin problem for the teenagers and young adults. A number of studies conducted mostly in foreigners have been published to investigate prevalence and psychological consequences of acne. Besides, there has been a recent interest to study the regularly suggested diet-acne relationship, which is considered important in the context of TCM. However, few studies have been conducted in Asia.

In Chapter *III*, a large cross-sectional study with objective and valid measurement amongst the adolescents and young adults in Hong Kong was performed. Over 93% of the subjects had a certain degree of acne. The prevalence of clinical acne was 40.4% and associated with a considerable impact on quality of life for the sufferers. To date, this is the first study to report these findings with objective assessments. The clinical severity did not necessarily directly proportional to the quality of life affected. These results are largely similar to those found in other large scale epidemiological studies. Improved understanding of the patients' psychological need is warranted in the formulation of the preventive or management strategies for the acne condition. The validated Cantonese CADI is useful for assessing the emotional morbidity for this purpose. One of the major limitations of this part of the study is not by complete random sampling method which may limit the generalisability of the results. In the future, a community based study with a more representative sample to further describe the acne prevalence in Hong Kong. Recent study

Moreover, the cross-sectional and the randomised controlled trial in study in Chapter *IV* provided evidence for the linkage between food and acne.

It is thus far the first study investigating the diet-acne relationship from a TCM perspective with valid method. The cross-sectional study employed the yin and yang principles and showed that the intake of foods from street stalls was significantly associated with a lower likelihood of accurence of acne for yin predominant person. As for the yang predominant person, the intake of desserts and fresh fruit juices was significantly associated with a higher likelihood of accurence of acne, whereas the intake of dairy and soy products was significantly associated with a lower likelihood of occurence of acne. This provided an exploratory detection of the relevance of food with acne. Subsequently, the randomised controlled trial demonstrated the effectiveness of the TCM syndromed tailored dietary advice for the patients of ICR subtype. The most important implication is that the characteristic individualising concept of TCM might be utilised in the understanding of the association of diet and acne and in the provision of dietary advice to patients with acne. A major limitation was the potential inadequate compliance of the dietary advice and inaccuracy in the reporting of the food consumption in adolescence, which is a general limitation of all nutritional studies. Further study which could recruit subjects to follow an assigned and restrictive diet is needed to minimise the possibility that errors may occur in any undesired dietary intake in the study period. Moreover, studies that clarify the patho-physiological mechanism underlying the association are warranted in the future, especially with regard to the hypothetical similarity between TCM ICR subtype and hormonal-driven type of acne.

In summary, the findings of this study could become insights for the re-allocation of medical resources to the very common and QOL impairing

disease of acne, as well as for the incorporation of evidence-based TCM dietary advice into the current clinical practice for the patients with acne in the future. Dietary manipulation according to TCM theory may be an important public health tool for treating acne patients. However, conclusive proof of the underlying mechanism is needed.

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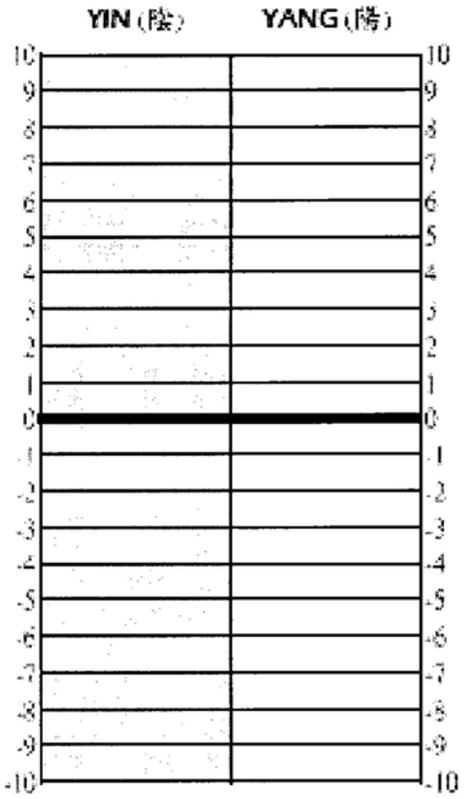
Appendix 1a. Yin yang scoring sheet

YIN YANG SCORING SHEET

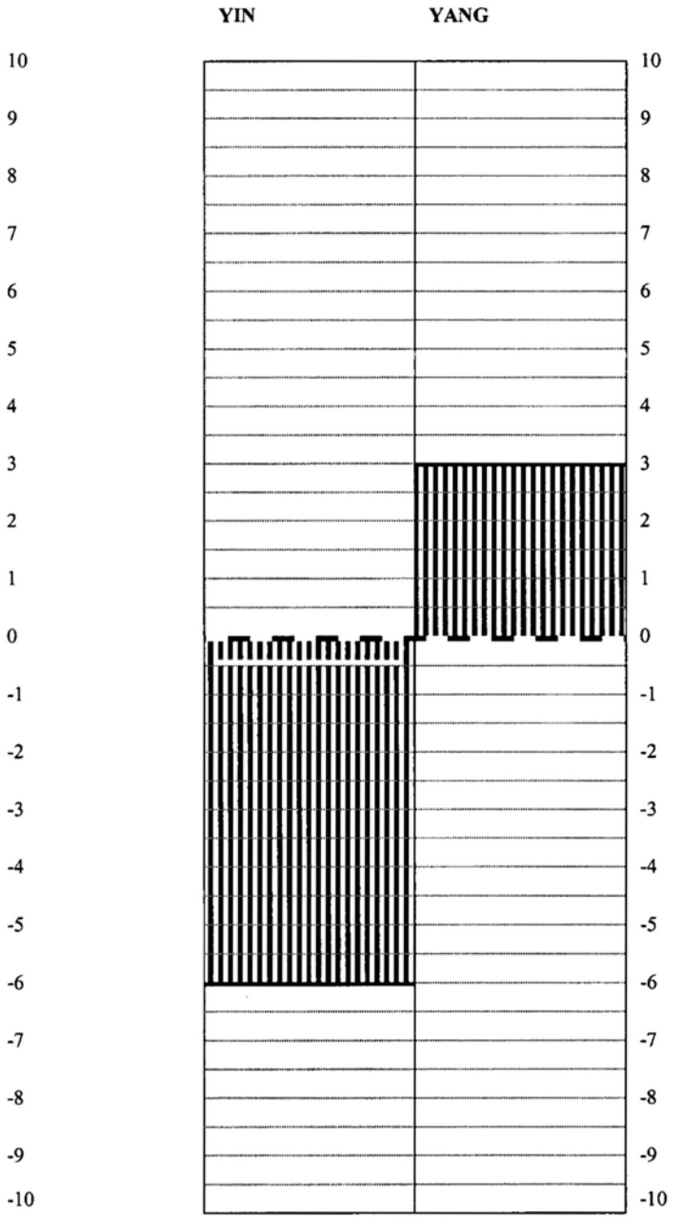


型：

供研究人員使用 (R4)

#_____

Appendix 1b. Yin yang scoring sheet – example of the score of yin and score of yang for subject number 141 as assessed by Chinese medicine practitioner A_



Appendix 2. Questionnaire used in the cross-sectional study amongst the university entrants

香港中文大學 社區及家庭醫學系
Department of Community and Family Medicine, The CUHK

暗瘡與健康關係調查

✤ 你所提供的資料，只供研究用途並絕對保密，請用 ✓ 選擇你的答案。

個人資料

姓名：______________(中文) ______________(英文)

性別：□(1) 男 □(2) 女

學生編號：______________

學系：______________

填寫日期：2006 年 8 月____日

供研究人員使用 # ______________

第一部份

卡的夫暗瘡指數問卷

1. 喺過去一個月裏面，你有冇因為暗瘡而覺得具攻擊性、沮喪、或者覺得尷尬？	□(3) 非常嚴重 □(2) 嚴重 □(1) 些少 □(0) 完全唔會
2. 喺過去一個月裏面，暗瘡有冇影響到你嘅日常社交生活，社交活動，或者同異性嘅關係？	□(3) 非常嚴重，影響所有嘅活動 □(2) 中等嚴重，影響大多數嘅活動 □(1) 間中，或者有啲活動 □(0) 完全唔會
3. 喺過去嗰一個月內，你有冇因為暗瘡而避免使用公眾更衣設施或者避免著泳衣游水？	□(3) 經常 □(2) 好多時候 □(1) 間中 □(0) 完全唔會
4. 你會點樣形容過去一個月內，你對你嘅皮膚外表嘅感覺？	□(3) 非常抑鬱同埋淒慘 □(2) 通常都會擔心 □(1) 間中會擔心 □(0) 無影響
5. 請指出你覺得你而家嘅暗瘡有幾差？	□(3) 最差嘅情況 □(2) 係一個大問題 □(1) 係一個小問題 □(0) 唔會構成問題

第二部份

1. 如果有一種新產品，比現有的一切治療癌症的產品更有效，幾乎一定能夠治癒你的病症，你願意付出多少金錢購買這產品呢？

- ☐ 港幣 500
- ☐ 港幣 1,000
- ☐ 港幣 5,000
- ☐ 港幣 10,000
- ☐ 港幣 50,000
- ☐ 港幣 50,000 或以上
- ☐ 不會購買

2. 假設以上產品價值港幣 15,000，如果有人無條件贈送以下任何一個選擇：

   A 這新產品　　　B 港幣 15,000

   你會選擇：
   - ☐ A
   - ☐ B

3. 你每個月大約有多少收入(包括工資和零用錢)？
   港幣__________

第四部份

知覺壓力量表

<u>在過去一個月內</u>，你對下列的事情感到：

1. 不能控制你生活裡重要的事情？	☐ 從來不 ☐ 幾乎不 ☐ 有時是 ☐ 常常是 ☐ 總是
2. 對於處理你個人問題的能力的信心？	☐ 總是有 ☐ 常常有 ☐ 有時有 ☐ 幾乎沒有 ☐ 從來沒有
3. 事情依照你的方式去做？	☐ 總是會 ☐ 常常會 ☐ 有時會 ☐ 幾乎不會 ☐ 從來不會
4. 事情太難，以致你無法去克服？	☐ 從來不會 ☐ 幾乎不會 ☐ 有時會 ☐ 常常會 ☐ 總是會

第三部份

以下問題與你有關過去7天所吃的食物。請回想你由早上起床至晚上睡覺期間所吃的三餐和小食，並記緊包括你在家中、學校、食店或任何其他地方所吃的食物。

*請參考場內圖片

請以圖片顯示所指的「1次份量」，在圖中所見紙碟的直徑為15厘米。

食物	1次份量*	0次	7天內1-3次	7天內4-6次	每天1次	每天2次	每天3次	每天4次或以上
a. 薯條、薯片、芝士條或蝦條等零食	1小包(約35克)	☐	☐	☐	☐	☐	☐	☐
b. 朱古力或糖果	3-5粒	☐	☐	☐	☐	☐	☐	☐
c. 涼果(如話梅、果乾或肉乾)	1小包(約25克)	☐	☐	☐	☐	☐	☐	☐
d. 點心、魚蛋、燒賣或串燒類小食	3-5件(約100克)	☐	☐	☐	☐	☐	☐	☐
e. 甜品、蛋糕、蛋撻、西餅或餅	1件(約150克)	☐	☐	☐	☐	☐	☐	☐
f. 汽水	1罐(約355毫升)	☐	☐	☐	☐	☐	☐	☐
g. 豆奶、檸檬茶、紙包果汁或其他含糖飲品	1杯(約250毫升)	☐	☐	☐	☐	☐	☐	☐
h. 100%純果汁如鮮橙汁(不包括含有果汁味的飲品)	1杯(約250毫升)	☐	☐	☐	☐	☐	☐	☐
i. 新鮮生果(不包括果汁)	1個(約150克)	☐	☐	☐	☐	☐	☐	☐
j. 蔬菜(如菜心、菜仔、紅蘿蔔等)	3/4碗(約100克)	☐	☐	☐	☐	☐	☐	☐
k. 奶類飲品及豆品製品(如鮮奶、朱古力奶、豆奶類)	1杯(約250毫升)	☐	☐	☐	☐	☐	☐	☐

在過去7天內，你光顧過以下食店多少次？

	0次	7天內1-3次	7天內4-6次	每天1次	每天2次	每天3次	每天4次或以上
街邊食檔/熟食小販	☐	☐	☐	☐	☐	☐	☐
快餐店	☐	☐	☐	☐	☐	☐	☐

你昨天所吃的三餐是從哪裏買來的？(*若是在家中預備的，請選「在家預備」)

	沒有進食	*在家預備	茶餐廳/餐室/快餐店	酒樓	學校	街邊食檔/小販	麵包店	便利店/超級市場	其他(請註明)
早餐 →	☐	☐	☐	☐	☐	☐	☐	☐	
午餐 →	☐	☐	☐	☐	☐	☐	☐	☐	
晚餐 →	☐	☐	☐	☐	☐	☐	☐	☐	

第五部份

1. 過去一個月內，你每晚平均睡多久呢？

___ 小時

2. 過去一個月內，你睡眠質素如何呢？

1	2	3	4	5
很差		一般		很好

3. 過去六個月內，你有沒有服用中藥治療痛經呢？

□(1) 有　　□(2) 沒有

□(3) 不適用，因為我沒有痛經

4. 過去六個月內，你有沒有服用醫生開給你用來治療痛經的藥物呢？

□(1) 有（如果你記得這藥物名稱，請註明：________________）

□(2) 沒有

□(3) 不適用，因為我沒有痛經

5. 過去六個月內，你有沒有自行購買治療痛經的藥物呢？

□(1) 有（如果你記得這藥物名稱，請註明：________________）

□(2) 沒有

□(3) 不適用，因為我沒有痛經

（***只需女性回答以下問題***）

6. 過去六個月內，你有沒有服用避孕藥呢？

□(1) 有（如果你記得這藥物名稱，請註明：________________）

□(2) 沒有

7. 你的痛經：

□(1) 在月經前較嚴重　　□(2) 在月經時較嚴重

□(3) 在月經後較嚴重　　□(4) 與月經無關

8. 你最近一次月經的第一天是何時？ ________年________月________日

9. 過去六個月經周期內，每次經期大約維持多少天？ ________天 至 ______天

（例：如果過去六個經期內，第一、二、三個經期維持了5天，第[illegible]個經期維持了6天，第六個經期維持了7天，就填5至7天）

10. 過去六個月經周期內，你的經期有規律嗎？

□(1) 有規律，大約______天至________天一個周期

□(2) 沒有規律，時早時遲

11. 過去六個月經周期內，你有沒有經痛呢？

□(1) 有經痛，並會服用止痛藥　　□(2) 有經痛，但不會服用止痛藥

□(3) 沒有經痛

《完》

Appendix 3. Questionnaire used in the randomised controlled trial amongst secondary schools

香港中文大學

社區及家庭醫學系

供研究人員使用 #
(Visit1)

根據中醫証型分類擬定飲食建議以治療暗瘡之隨機對照臨床研究

研究資料　　填寫日期：　　年　　月　　日

一般個人資料

- 姓名：(中文)　　(英文)
- 性別：❑(1) 男　❑(2) 女
- 身份証號碼：(　)
- 出生日期：　　年　　月　　日
- 電話號碼：(手机)　　(家)
- 電郵地址：
- 就讀學校名稱：　　就讀班別：　　學號：
- 身高：(厘米 cm)　體重：(公斤 kg)
- 住址：
- 在過去 6 個月內，你認爲你的暗瘡嚴重程度大概是：（請圈適當分數）

0　1　2　3　4　5　6　7　8　9

完全沒有暗瘡　　非常嚴重

有關暗瘡的資料

1. 在過去 6 個月裡，你認爲你有患上其他主要疾病嗎？

   ❑(1) 有（請註明是什麼主要疾病：_____（請轉至 2.1）

   ❑(2) 沒有（請轉至 3）

2. 你曾因爲這些主要疾病而西醫或中醫求診呢？

   ❑(1) 有，請註明你到哪裡求診：_____

   ❑(2) 沒有

   2.1.1 在過去 6 個月裡，你曾因爲治療你的主要疾病而長期服用成藥或西醫／中醫處方的藥物嗎？

疾病	成藥？	西醫處方	中醫處方	藥物名稱	服用方法
（例）濕疹	是 (1) / 否(2)	是 (1) / 否(2)	是 (1) / 否(2)		
	是 (1) / 否(2)	是 (1) / 否(2)	是 (1) / 否(2)		
	是 (1) / 否(2)	是 (1) / 否(2)	是 (1) / 否(2)		
	是 (1) / 否(2)	是 (1) / 否(2)	是 (1) / 否(2)		
	是 (1) / 否(2)	是 (1) / 否(2)	是 (1) / 否(2)		

3. 卡的夫暗瘡指數問卷 (CADI)

1. 喺過去一個月裏面，你有無因為暗瘡而覺得煩躁，沮喪，或者覺得尷尬？	❑(3) 非常嚴重 ❑(2) 嚴重 ❑(1) 些少 ❑(0) 完全唔會
2. 喺過去一個月裏面，暗瘡有無影響到你嘅日常社交生活，社交活動，或者同異性嘅關係？	❑(3) 非常嚴重，影響所有嘅活動 ❑(2) 中等嚴重，影響大多數嘅活動 ❑(1) 間中，或者有啲活動 ❑(0) 完全唔會
3. 喺過去嘅一個月內，你有無因為暗瘡而避免使用公眾更衣設施或者避免著泳衣/泳褲？	❑(3) 經常 ❑(2) 好多時候 ❑(1) 間中 ❑(0) 完全唔會
4. 你會點樣形容過去一個月內，你對你嘅皮膚外表嘅感覺？	❑(3) 非常抑鬱同埋淒慘 ❑(2) 通常都會掛住 ❑(1) 間中會掛住 ❑(0) 無影響
5. 請指出你覺得你而家嘅暗瘡有幾差？	❑(3) 最差嘅情況 ❑(2) 係一個大問題 ❑(1) 係一個小問題 ❑(0) 唔會構成問題

4. 知覺壓力量表 (PSS-4)

在最近一個月裡，你對下列的事情感到：

1. 不能控制你生活裡重要的事情？	❑(0) 從來不 ❑(1) 幾乎不 ❑(2) 有時是 ❑(3) 常常是 ❑(4) 總是
2. 對於處理你個人問題的能力的信心？	❑(0) 總是有 ❑(1) 常常有 ❑(2) 有時有 ❑(3) 幾乎沒有 ❑(4) 從來沒有
3. 事情依照你的方式去做？	❑(0) 總是會 ❑(1) 常常會 ❑(2) 有時會 ❑(3) 幾乎不會 ❑(4) 從來不會

4. 事情太難，以致於你無法去克服？	❑(0) 從來不會 ❑(1) 幾乎不會 ❑(2) 有時會 ❑(3) 常常會 ❑(3) 總是會

5. 其他問題:

(i) 在過去 7 天內，你有多少天曾參與任何運動令心跳加速及呼吸急速累積達 60 分鐘或以上)？

❑0天 ❑1天 ❑2天 ❑3天 ❑4天 ❑5天 ❑6天 ❑7天

(ii) **匹茲堡睡眠質量指數 (PSQI)**

*以下問題與你的睡眠習慣有關。請根據你**近1個月**的實際情況，回答所有問題。*
〔你的最準確的答覆應該以大多數的日與夜來表明。〕

近1個月，

1. 晚上睡覺通常是 _____ 點鐘；
2. 每晚入睡通常需 _____ 分鐘；
3. 通常早上 _____ 點起床；
4. 每夜通常實際睡眠 _____ 小時〔不等於臥床時間〕。

對下列問題請用"✓"就劃出一個最合適的答案：

5. 近1個月，因下列情況影響睡眠而煩惱：		無	<1 次/週	1 - 2 次/週	3 次/週
	a. 入睡困難(30 分鐘內不能入睡)	0	1	2	3
	b. 夜間易醒或早醒	0	1	2	3
	c. 夜間去廁所	0	1	2	3
	d. 呼吸不暢	0	1	2	3
	e. 咳嗽或鼾聲高	0	1	2	3
	f. 感覺冷	0	1	2	3
	g. 感覺熱	0	1	2	3
	h. 做惡夢	0	1	2	3
	i. 疼痛不適	0	1	2	3
	j. 其他影響睡眠的事情〔如有，請說明： _____ _____〕	0	1	2	3
6. 近1個月，你服用安眠藥的次數？		0	1	2	3
7. 近1個月〔當駕駛、吃飯、或參與社會活動時〕你常感到困倦嗎？		0	1	2	3
8. 近1個月，你做事情的精力不足嗎？		沒有	偶爾有	有時有	經常有
9. 近1個月，總括來說，你認爲自己的睡眠？		很好	較好	較差	很差

請在空格填「✓」號，及在（　）內填適當數字

School name: _____ (Visit 1/2/3)
姓名: _____
班別: _____
學號: _____

肉類 Meats

食物種類 Type of Food	編碼 Code	過去一個月的次數 How Often Within the Past Month?								每次有多少 How much each time?	參考份量 Reference Portion
		從來 Never	一月一次 Once per Month	一月二至三次 2 – 3 Times per Month	一星期一次 Once per Week	一星期二次 Twice per Week	一星期三至四次 3 – 4 Times per Week	一星期五至六次 5 – 6 Times per Week	每日 Every day		
叉燒瘦肉 BBQ pork/Pork, Lean	580	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	6 pieces = 50g
半肥瘦叉燒 BBQ Pork, Lean & Fat	581	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	5 pieces = 50g
瘦排骨 Spare Ribs, Lean	569	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	4 pieces = 50g
半肥瘦排骨 Spare Ribs, Lean & Fat	570	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	4 pieces = 50g
瘦燒肉 Roast Pork, Lean	566 (1pc)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 件 pieces	1 piece = 25g
半肥瘦燒肉 Roast Pork, Lean & Fat (with 24% fat)	585	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 件 pieces	1 piece = 25g
豬扒 Pork Chop	567	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 件 pieces	1 piece = 100g
豬肉 Pork Flank	650	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	6 pieces = 50g
牛扒 Beef Sirloin,	551	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 件 pieces	1 piece = 100g
牛肉 Beef Flank	650	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	6 pieces = 50g
牛腩 Briskets	562	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	4 pieces = 50g
雞扒 Chicken fillet	551	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 件 pieces	1 piece = 100g
雞肉 Chicken	602 (p)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 100g
雞翼 Chicken wing	604 (m)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 隻 pieces	1 piece = 30g
雞髀 Chicken Thigh	608	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 隻 pieces	1 piece = 100g
燒鵝 Roast Goose	623	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 100g
燒鴨 Roast Duck	620	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 100g
羊肉 Lamb	640	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	6 pieces = 50g
乳鴿 Baby Pigeons	630	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1/4 piece = 50g
雞肝 Chicken Liver	610	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	6 slices = 50g
豬肝 Pig Liver	571	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	6 slices = 50g

食物種類 Type of Food	編碼 Code	過去一個月的次數 How Often Within the Past Month?								每次有多少 How much each time?	參考份量 Reference Portion
		從未 Never	一月一次 Once per Month	一月二至三次 2 – 3 Times per Month	一星期一次 Once per Week	一星期二次 Twice per Week	一星期三至四次 3 – 4 Times per Week	一星期五至六次 5 – 6 Times per Week	每日 Every day		
牛什 Beef Offal	2015	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	6 slices = 50g
腸仔 Sausage	578	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 條 rolls	1 roll = 50g
中國臘腸 Chinese Sausage	574	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 條 rolls	1 roll = 50g
中國潤腸 Chinese liver sausage	591	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 條 rolls	1 roll = 50g
腊鴨髀 Duck Thigh, Dried, Preserved & Salted	620	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	1 serving = 50g
腊肉 Pork, Dried, Preserved & Salted	589	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	1 serving = 25g
火腿 Ham	575	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	2 pieces = 50g
午餐肉 Canned luncheon Meat	572	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	2 pieces = 50g
漢堡扒 Hamburger Patties	552 (I)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 件 pieces	1 piece = 70g

你或幫你煮食肉類的人通常用下列那幾種烹調方法？

蒸	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
炒	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
煎	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
炸	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
焗	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
滾或烚	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
燉	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
燜	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
燒烤	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
微波爐	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多

其他：_____

當你吃肉前，見到肉上有可見脂肪時，你會

1. □ 先除去全部脂肪　3. □ 完全不除去脂肪
2. □ 先除去一部份脂肪　4. □ 不吃見有脂肪的肉類

當你吃家禽時(雞，鴨，鵝，鵪等)你會除去多少皮？

1. □ 全部皮　3. □ 完全不除皮
2 □ 一部份皮　4. □ 不吃家禽

奶類及飲料 Dairy Products & Beverages

食物種類 Type of Food	編碼 Code	過去一個月的次數 How Often Within the Past Month?								每次有多少 How much each time?	參考份量 Reference Portion
		從來 Never	一月一次 Once per Month	一月二至三次 2 – 3 Times per Month	一星期一次 Once per Week	一星期二次 Twice per Week	一星期三至四次 3 – 4 Times per Week	一星期五至六次 5 – 6 Times per Week	每日 Every day		
		(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)		
全脂牛奶 Whole Milk	76									( ) 杯 cups	1 cup = 250ml
脫脂奶 Skimmed Milk	79									( ) 杯 cups	1 cup = 250ml
朱古力奶 Chocolate Milk	78									( ) 杯 cups	1 cup = 250ml
全脂奶粉 Whole Milk Powder	82									( ) 湯匙 tablespoons	1 Tablespoon = 7g
脫脂奶粉 Skim Milk Powder	83 (1 Tbp)									( ) 湯匙 tablespoons	1 Tablespoon = 7g
高鈣脫脂奶粉 High CalciumSkim Milk Powder	136									( ) 殼 scoops	1 scoop = 6.25g
芝士 Cheese	95									( ) 片 slices	1 slice = 20g
全脂酸乳酪 Whole Fat Yogurt	111									( ) 杯 cups	1 cup = 150g
低脂酸乳酪 Low Fat Yogurt	112									( ) 杯 cups	1 cup = 150g
雪糕 Ice Cream	99 (c)									( ) 杯 cups	1 cup = 134ml
奶昔 Milk Shake	2117									( ) 杯 cups	1 cup = 300ml
沙律醬 Mayonnaise	2456									( ) 湯匙 tablespoons	1 tablespoon = 15g
朱古力粉 Chocolate Power Drink	2267									( ) 湯匙 tablespoons	1 Tbsp = 5 g
好立克 Horlick	2268									( ) 湯匙 tablespoons	1 Tbsp = 5 g
阿華田 Ovaltine	2269									( ) 湯匙 tablespoons	1 Tbsp = 5 g
汽水 Diet coke 2252 Fanta Orange 2254 Sprite 2253	(can)									( ) 罐 cans	1 can = 350ml
益力多 Yakult	2260									( ) 枝 bottles	1 bottle = 100g
新鮮果汁 Fresh Fruit Juices	2298									( ) 杯 cups	1 cup = 250ml
罐頭盒裝果汁 Canned/Bottled Juices	2301									( ) 盒 packs	1 pack = 250ml
豆漿 Soy Milk	2292									( ) 杯 cups	1 cup = 250ml

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紙包飲品 Sweetened Carton drinks	3016	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 盒 packs	1 pack = 250ml
茶 Tea	2282	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 杯 cups	1 cup = 250ml
咖啡 Coffee	2273	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 杯 cups	1 cup = 250ml
酒 Wine	2276	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 杯 cups	1 cup = 250ml
水 Mineral Water	2305	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 杯 cups	1 cup = 250ml
其他 Others										( ) 杯 cups	

小食類 Snacks

食物種類 Type of Food	編碼 Code	過去一個月的次數 How Often Within the Past Month?								每次有多少 How much each time?	參考份量 Reference Portion
		從未 Never	一月一次 Once per Month	一月二至三次 2 – 3 Times per Month	一星期一次 Once per Week	一星期二次 Twice per Week	一星期三至四次 3 – 4 Times per Week	一星期五至六次 5 – 6 Times per Week	每日 Every day		
雲吞 Wonton	3066	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 隻 pieces	1 piece = 20g
叉燒包 BBQ Pork Bun	2004 (1)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 個 pieces	1 piece = 75g
蓮蓉包/奶黃包 Sweet Bun w/ Lotus Seed Paste/Egg Yolk Filling	2009	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 個 pieces	1 piece = 40g
蒸點心 Steamed Dim Sum	3060	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 個 pieces	1 piece = 20g
炸點心 Deep Fried Dumplings	3064	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 件 pieces	1 piece = 35g
鳳爪 Chicken Paw	2010	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碟 plates	1 plate = 25g
油炸鬼 "Yau-Char-Kwai" (Deep Fried Dough)	2020	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 條 pieces	1 piece = 70g
意大利薄餅 Pizza	2134 (reg)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 件 pieces	1 piece = 120g
漢堡包 Hamburger	2101	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 件 pieces	1 piece = 100g
魚柳包 Fish Burger	2109	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 件 pieces	1 piece = 140g
麥樂雞 Chicken Nuggets	2108	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 件 pieces	1 piece = 20g
薯餅 Hash Brown	2121	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 件 pieces	1 piece = 50g
豬肉批 Pork Pie	2042	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 件 pieces	1 piece = 100g
蘋果批 Apple Pie	2112	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 件 pieces	1 piece = 100g
牛肉乾 Glazed Beef Jerky	564	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 塊 pieces	3 pieces = 100g
豬肉乾 Glazed Pork Jerky	579 (3pc)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 塊 pieces	3 pieces = 100g
牛肉鬆 Beef Floss	563	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 包 packs	1 pack = 25g
豬肉鬆 Pork Floss	579 (1pack M)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 包 packs	1 pack = 25g

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		從未 Never	一月一次 Once per Month	一月二至三次 2 – 3 Times per Month	一星期一次 Once per Week	一星期二次 Twice per Week	一星期三至四次 3 – 4 Times per Week	一星期五至六次 5 – 6 Times per Week	每日 Every day		
魷魚絲 Dried Squid Strings	956	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 包 packs	1 pack = 20g
糖水 Chinese Sweet Soup Desserts	2016	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 碗 bowls	1 bowl = 200g
豆腐花 Tofu Fa	1555	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 碗 bowls	1 bowl = 200g
咸餅乾 Saltines/Cream Crackers	287	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings.	3 pieces = 25g
甜餅乾 Semi-sweet Biscuits	292 2 pc (s)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	2 pieces = 20g
朱古力餅乾 Chocolate Coated Biscuits	295	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	3 pieces = 40g
合桃酥 Walnut Short Cakes	2040	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 件 piece	1 piece = 150g
牛奶布甸 Milk Pudding	120	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 杯 cups	1 cup = 120g
蛋撻 Egg Tart	302 (1)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 件 piece	1 piece = 60g
炸薯條 French Fries	2110 1 pack (m)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 100g
炸薯片 Potato Chips	2467 1 pack (m)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 包 packs	1 small pack = 35g
軟蛋糕 Spongy Cake	301 1 roll (garden)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 件 pieces	1 piece = 70g
牛油蛋糕 Pound Cake	300	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 件 slices	1 slice = 80g
朱古力 Milk Chocolate	2461 (tri 1 pc)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 粒 pieces	1 piece = 10g
糖果 Candies	3017	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 粒 pieces	1 piece = 5g
蜜糖 Honey	2452	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 湯匙 tablespoons	1 tablespoon = 20g
果醬 Jam	2453 (Tbp)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 湯匙 tablespoons	1 tablespoon = 20g
花生醬 Peanut Butter	2454 (Tbp)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	湯匙 tablespoons	1 tablespoon = 15g
糖 Sugar	2451	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	湯匙 tablespoons	1 tablespoon = 10g

魚類及海產類 Fishes & Seafood

食物種類 Type of Food	編碼 Code	過去一個月的次數 How Often Within the Past Month?								每次有多少 How much each time?	參考份量 Reference Portion
		從來 Never	一月一次 Once per Month	一月二至三次 2 – 3 Times per Month	一星期一次 Ouce per Week	一星期二次 Twice per Week	一星期三至四次 3 – 4 Times per Week	一星期五至六次 5 – 6 Times per Week	每日 Every day		
草魚/鯇魚 Grass Fish	952 (p)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	1 serving = 200g
大頭魚 Big Head Fish	988	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	1 serving = 100g
鯪魚 Mud Carp	985	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	1 serving = 100g
鰻魚 Eel	975	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	10 slices = 50g
白鱔 Japanese eel	989	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	10 slices = 50g
鯽魚 Blace	982	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	1 serving = 100g
紅衫魚/馬頭 Golden Thread/Horse Head	953	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	1 serving = 100g
桂花魚 Kwai Fa Fish	996	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	1 serving = 100g
生魚 Snake Head	984	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	10 slices = 50g
鯉魚 Carp	981	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	1 serving = 100g
鮰魚 Catfish	980	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	1 serving = 100g
石斑魚 Grouper	954	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	1 serving = 100g
馬鮫魚 Mackerel	991	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	1 serving = 100g
帶魚 Ribbon Fish	987	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	1 serving = 100g
大眼魚 Big Eye Fish	992	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	1 serving = 100g
鮮魚 Squid	955	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	7 slices = 50g
生蠔 Oysters	967	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	6 pieces = 50g
蠔豉 Dried Oysters	968	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	10 pieces = 50g
蝦 Prawns	964 (2pc)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	2 pieces = 50g
蟹 Crabs	969	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	1 serving = 50g
帶子/瑤柱 Scallops/Dried Scallops	970	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	3 pieces = 20g
海參 (乾) Sea Cucumbers	976	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	1 serving = 5g

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炸魚蛋（黃色外皮） Fish Balls	958	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	5 pieces = 100g
魚片 Fish Cakes	957 (4pc)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	4 slices = 50g
墨魚 Cuttlefish	986	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	7 slices = 50g
鯪魚球 Mud Carp Fish Balls	985	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	2 pieces = 50g
罐頭沙丁魚 Canned Sardines	961	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 件 pieces	1 piece = 50g
豉汁煎鯪魚 Fried Dace with Black Bean Sauce	974	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 件 pieces	1piece = 50g
吞拿魚 Tuna Fish	962 (1/3 can)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1/3 can = 50g
咸魚 Salted Preserved Fish	977	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 片 slices	1 slice = 5g
海蜇 Jelly Fish	978	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 50g
三文魚 Salmons	990	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	5 pieces = 100g
其他 Others		(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)		
其他 Others		(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)		
其他 Others		(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)		

你或朋友食食魚類或海產的人通常用下列那幾種烹調方法？

蒸	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
炒	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
煎	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
炸	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
焗	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
滾或烚	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
燉	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
焖	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
燒烤	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
微波爐	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多

其他：_____

蔬菜類/豆類 Vegetables & Beans

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菜心 Choy Sum	1202	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碟 plates	1 plate = 100g
白菜 Bok Choy	1201 (p)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碟 plates	1 plate = 100g
芥蘭 Chinese Kale	1245	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碟 plates	1 plate = 100g
西蘭花 Broccoli	1207	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碟 plates	1 plate = 50g
椰菜花 Cauliflowers	1208	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碟 plates	1 plate =50g
莧菜 Chinese Spinach	1211	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碟 plates	1 plate = 100g
西洋菜 Watercress	1237	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碟 plates	1 plate = 100g
菠菜 Spinach	1270	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碟 plates	1 plate = 100g
通菜 Water Spinach	1209	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碟 plates	1 plate = 100g
韭菜 Chinese Chives	1247	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碟 plates	1 plate = 100g
豆苗 Pea Shoots	1242	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碟 plates	1 plate = 100g
椰菜 Cabbages	1204	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碟 plates	1 plate = 100g
黃芽白 Celery Cabbages	1203	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碟 plates	1 plate = 100g
生菜 Lettuce	1205	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碟 plates	1 plate = 100g
蘆筍 Asparagus	1238	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碟 plates	1 plate =50g
西芹 Celery	1271	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碟 plates	1 plate =50g
鮮黃豆 Fresh Soybeans	1244	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	1 serving = 50g
硬豆腐 Tofu, Hard	1552	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	1 serving = 50g
布包豆腐 Tofu, Soft	1552 (cube)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 磚 cubes	1 cube = 300g
腐竹 Dried Tofu Sheets	1553	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 份 servings	1 serving = 50g = 2 Tbsp
油炸豆腐 Deep Fried Tofu	1576	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 件 pieces	1 piece = 60g
豆腐泡 Deep Fried Tofu Pockets	1554	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 件 pieces	1 piece = 16 g

食物種類 Type of Food	編碼 Code	過去一個月的次數 How Often Within the Past Month?								每次有多少 How much each time?	參考份量 Reference Portion
		從來 Never	一月一次 Once per Month	一月二至三次 2 – 3 Times per Month	一星期一次 Once per Week	一星期二次 Twice per Week	一星期三至四次 3 – 4 Times per Week	一星期五至六次 5 – 6 Times per Week	每日 Every day		
豆腐 Tofu Skin	1556	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 50g
素雞 Vegetarian Chicken	2651	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	3 pieces = 50g
麵筋 Wheat Gluten	284	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 50g
豆芽 Mungbean Sprouts	1222	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 碟 plates	1 plate = 100g
焗豆 Baked Beans	1551 (p)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 50g
紅豆(乾) Red Bean (Dried)	1560	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 25g
黑豆(乾) Black Eye Peas, dried	1558 (p)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 50g
四季豆/甜豆 Snap Beans	1243	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 碟 plates	1 plate = 50g
荷蘭豆 Snow Peas	1230	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 碟 plates	1 plate = 100g
青豆 Green Peas	1215 (p)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 50g
蠶豆 Broad Beans	1240	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 50g
豆角 String Beans	1213	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 50g
洋蔥 Onions	1226	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 50g
紅蘿蔔 Carrots	1216 (p)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 50g
蘿蔔 Chinese Radish	1246	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 50g
番薯 Sweet Potatoes	1251	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 50g
薯仔 Potatoes	1224	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 50g
南瓜 Pumpkins	1253	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 100g
蓮藕 Lotus Roots	1250	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 50g
馬蹄 Water Chestnuts	1249	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	7 pieces = 50g
竹筍 Bamboo Shoots	1241	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 50g
節瓜 Hairy Melons	1227	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　) 份 servings	1 serving = 100g

食物種類 Type of Food	編碼 Code	過去一個月的次數 How Often Within the Past Month?								每次有多少 How much each time?	參考份量 Reference Portion
		從來 Never	一月一次 Once per Month	一月二至三次 2 – 3 Times per Month	一星期一次 Once per Week	一星期二次 Twice per Week	一星期三至四次 3 – 4 Times per Week	一星期五至六次 5 – 6 Times per Week	每日 Every day		
		(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)		
青瓜 Cucumbers	1228									( ) 份 servings	1 serving = 100g
苦瓜 Bitter Melons	1248									( ) 份 servings	1 serving = 100g
冬瓜 Winter Melons	1212									( ) 份 servings	1 serving = 100g
蕃茄 Tomatoes	1221									( ) 份 servings	1 serving = 100g
紅椒 Red Capsicum/pepper	1274									( ) 份 servings	1 serving = 100g
青椒 Green Capsicum	1273									( ) 份 servings	1 serving = 100g
甜鮮粟米 Sweet Corns	1218									( ) 份 servings	1 serving = 50g
粟米粒 Canned Corns	1219									( ) 份 servings	1 serving = 50g
絲瓜 Angled Loofah	1252									( ) 份 servings	1 serving = 100g
茄子/矮瓜 Eggplants	1239									( ) 份 servings	1 serving = 100g
鮮菇 Fresh Mushrooms	1275									( ) 份 servings	10 pieces = 100g
白木耳/雪耳/雪耳/木耳(乾) White Fungus	1458									( ) 份 servings	1 serving = 10g
髮菜 (乾) Black Moss	1454									( ) 份 servings	1 serving = 10g
炸菜 Preserved Radish	1501									( ) 份 servings	6 slices = 50g
冬菜 Preserved Vegetables	1503									( ) 湯匙 tablespoons	1 tablespoon = 5 g
菜菜 Preserved Greens	1502									( ) 湯匙 tablespoons	1 tablespoon = 5 g
栗子 Chestnut	1566									( ) 粒 pieces	1 piece = 10g
腰果 Cashew Nuts	1564									( ) 份 servings	1 serving = 35g
花生 Peanut	1568 (p)									( ) 份 servings	1 serving = 25g

你或和你煮食蔬菜或豆類的人通常用下列那幾種烹調方法？

蒸	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
炒	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
煎	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
炸	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
焗	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
滾或烚	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
燉	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
焖	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
燒烤	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
微波爐	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多

其他：_____

水果類 Fruits

食物種類 Type of Food	編碼 Code	過去一個月的次數 How Often Within the Past Month?								每次有多少 How much each time?	參考份量 Reference Portion
		從未 Never	一月一次 Once per Month	一月二至三次 2 – 3 Times per Month	一星期一次 Once per Week	一星期二次 Twice per Week	一星期三至四次 3 – 4 Times per Week	一星期五至六次 5 – 6 Times per Week	每日 Every day		
		(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)		
橙 Oranges	1726 (m)									( ) 個 pieces	1 piece = 150g
西柚 Grapefruits	1706									( ) 個 pieces	1 piece = 150g
蘋果 Apples	1701 (m)									( ) 個 pieces	1 piece = 150g
梨 Pears	1717									( ) 個 pieces	1 piece = 180g
香蕉 Bananas	1704 (m)									( ) 隻 pieces	1 piece = 200g
榴槤 Durian										( ) 份 servings	1 serving = 100g
蜜瓜 Honeydew Melons	1714									( ) 份 servings	1 serving = 100g
西瓜 Watermelon	1729									( ) 份 servings	1 serving = 100g
菠蘿 Pineapples	1724									( ) 片 slices	1 slice = 70g
士多啤梨 Strawberries	1734									( ) 份 servings	4 pieces = 100g
桃 Peaches	1721 (m)									( ) 個 pieces	1 piece = 200g
芒果 Mangos	1713									( ) 個 pieces	1 piece = 200g
柿 Persimmons	1728									( ) 個 pieces	1 piece = 100g
奇異果 Kiwi fruits	1731									( ) 個 pieces	1 piece = 75g
杏 Apricots	1702									( ) 個 pieces	1 piece = 35g
西梅 Prunes	1720									( ) 份 servings	2 pieces = 100g
提子 Grapes	3082 (m)									( ) 份 servings	10 pieces = 100g
荔枝 Lychee	1711									( ) 份 servings	10 pieces = 100g
龍眼 Longans	1712									( ) 份 servings	10 pieces = 30g
車厘子 Cherries	1705 (l)									( ) 份 servings	10 pieces = 100g
木瓜 Papayas	1716									( ) 份 servings	1 serving = 400g
柚子(沙田柚) Pomelo	1733									( ) 件 pieces	1 piece = 70g
檸檬 Lemons	1710									( ) 個 pieces	1 piece = 100g

食物種類 Type of Food	編碼 Code	過去一個月的次數 How Often Within the Past Month?								每次有多少 How much each time?	參考份量 Reference Portion
		從來 Never	一月一次 Once per Month	一月二至三次 2 – 3 Times per Month	一星期一次 Once per Week	一星期二次 Twice per Week	一星期三至四次 3 – 4 Times per Week	一星期五至六次 5 – 6 Times per Week	每日 Every day		
糖漿雜果 Fruit Cocktail in Syrup	1740	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　　) 份 servings	1 serving = 30g
杏脯 Dried Apricot	1703	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　　) 份 servings	10 pieces = 20g
西梅乾 Dried Prunes	1725	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　　) 件 pieces	1 piece = 7g
葡萄乾 Raisins	1709 (match box)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　　) 盒 boxes	1 small box = 40g
紅黑棗 Dried Dates	1732	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(　　) 份 servings	15 pieces = 20g
其他 Others		(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)		

五穀類 Grains

食物種類 Type of Food	編碼 Code	過去一個月的次數 How Often Within the Past Month?								每次有多少 How much each time?	參考份量 Reference Portion
		從未 Never	一月一次 Ouce per Month	一月二至三次 2 – 3 Times per Month	一星期一次 Once per Week	一星期二次 Twice per Week	一星期三至四次 3 – 4 Times per Week	一星期五至六次 5 – 6 Times per Week	每日 Every day		
米飯 Rice	274	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碗 bowls	1 bowl = 200g
粥 Congee	276	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碗 bowls	1 bowl = 100g
麵/烏冬 Wheat Noodles/Udon	270	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碗 bowls	1 bowl = 200g
即食麵 Instant Noodles	272	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碗 bowls	1 bowl = 200g
米粉 Rice Vermicelli	280	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碗 bowls	1 bowl = 200g
通心粉 Macaroni	269	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碗 bowls	1 bowl = 200g
意大利粉 Pasta	273	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碟 plates	1 plate = 100g
麥皮 Oatmeal	286	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 碗 bowls	1 bowl = 100g
粟米片 Corn Flakes	311	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 盒 boxes	1 box = 25g
香甜三米片 Frosties	314	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 盒 boxes	1 box = 25g
饅頭 Chinese Steam Buns (Mann-Tau)	2023	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 件 pieces	1 piece = 50g
波包 Plain rolls	254 (roll)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 件 pieces	1 piece = 70g
白方包 White Breads	251 (w/ crust)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 片 slices	1 slice = 50g
全麥麵包 Whole Wheat Breads	253 (w/ crust)	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 件 slices	1 slice = 50g
甜包 Sweet Rolls	255	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 件 pieces	1 piece = 70g
其他 Others		(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)		

蛋類 Eggs

食物種類 Type of Food	編碼 Code	過去一個月的次數 How Often Within the Past Month?								每次有多少 How much each time?	參考份量 Reference Portion
		從來 Never	一月一次 Once per Month	一月二至三次 2 – 3 Times per Month	一星期一次 Once per Week	一星期二次 Twice per Week	一星期三至四次 3 – 4 Times per Week	一星期五至六次 5 – 6 Times per Week	每日 Every day		
雞蛋 Eggs	1155	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 隻 pieces	1 piece = 50g
皮蛋 Century Eggs	1157	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 隻 pieces	1 piece = 50g
咸蛋 Salted Duck Eggs	1156	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 隻 pieces	1 piece = 50g
鵪鶉蛋 Quail Eggs	1158	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	( ) 隻 pieces	1 piece = 10g
其他 Others		(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)		

你或幫你煮食蛋類的人通常用下列那幾種烹調方法？

蒸	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
炒	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
煎	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
炸	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
焗	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
滾或烚	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
燉	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
燜	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
燒烤	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多
微波爐	1.□無	2.□甚少	3.□適中	4.□甚多	5.□非常多