Nutritional Status in Patients with Systemic Sclerosis at Scleroderma Clinic, Srinagarind University Hospital, Thailand

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Abstract

Objectives: Systemic sclerosis (SSc) is a connective tissue disease that involves multiple organs. Recently, there has been a lack of Thailand data on the prevalence, severity, nutritional status and risk factors of malnutrition in SSc. Therefore, we designed this research to study prevalence, severity, nutritional status and malnutrition risk factors in SSc at Srinakarin University Hospital, Thailand.
Method: This study was a non-randomized cross-sectional study conducted in the scleroderma clinic at Srinakarin University Hospital between 2011-2012. After obtaining informed consent, the patient was followed up in the next two months for a venous blood sample and evaluation of nutritional status by asking for a history and performing a physical exam.
Results: Regarding nutritional status, SSc patients who were malnourished were 34 (46.58%). In the malnutrition group, we found that severe malnutrition was 13 (17.81%). However, multivariate analysis was insignificant regarding risk factors in the malnutrition group; the severe malnutrition group showed that difficulty chewing and dental carries were statistically significant.
Conclusions: In the scleroderma clinic at Srinakarin University Hospital, SSc patients have malnutrition, and some have severe malnutrition. We suggest that difficult chewing and dental carries were risk factors in the severe malnutrition group. Perhaps good oral hygiene may protect against severe malnutrition in SSc patients.

Keywords: Systemic sclerosis, scleroderma, scleroderma and related disorder, nutrition status, malnutrition, gastrointestinal

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Introduction

Systemic sclerosis (SSc) is a rare connective tissue disease characterized by fibrosis and destruction of the microvasculature. Increased collagen deposition and other extracellular matrix components affect the skin and most internal organs, including the lungs, heart, kidneys and the gastrointestinal (GI) tract. (1, 2) No data on prevalence is shown in Thailand. The disease mostly occurs in northern and northeastern areas of Thailand. For statistical data in the scleroderma clinic, Srinagarind University Hospital, Khon Kaen University (KKU), Khon Kaen Thailand, between 1997-2000, has new cases, approximately about 84-141 cases per year. It is associated with genetic HLA-DRB1 and HLA-DQB1 1501. The most common causes of death in systemic sclerosis are cardiovascular and pulmonary systems. (3-5)

According to the data on GI involvement of patients in Thailand, about 52% of patients had esophageal hypomotility or GI involvement. (6) Szamosi et al. 's study of 246 SSc patients showed that 71.9% had developed significant clinical involvement in the alimentary tract. The most common findings were esophageal involvement, including gastro-esophageal reflux disease (GERD), aperistalsis, pseudodiverticuli, etc. In addition, diseases of the stomach, dysfunctions of the colon and anorectal, sclerosis of the biliary tract and other pancreato-biliary disorders (9.8%) also occurred. Some patients in this study had weight loss as well. (7)

The GI system is the most commonly involved organ in SSc (8), and a few studies have shown that esophageal and small intestine dysfunction can cause malnutrition (9-11). Baron M. et al. studied malnutrition in SSc, showing that the risk for malnutrition in SSc was moderate and associated with shorter disease duration, markers of GI involvement, and disease severity. The significant correlation of high malnutrition risk included the number of GI complaints, disease duration, diffuse disease, global

assessment of disease severity, hemoglobin, oral aperture, abdominal distension on physical examination, and physician-assessed possible malabsorption. (12) Another study Krause L et al., showed that 55.7% of patients had malnutrition. In calculation by multivariate analysis, low predicted forced vital capacity and high N-terminal (NT)-proBNP values discriminated best between good and bad nutritional status. Furthermore, this study concluded that BMI and BMI values did not identify malnutrition were not related to disease symptoms or mortality. (13)

Recently, there has been a lack of data on the prevalence, severity, nutritional status and malnutrition risk factors in SSc, Thailand. Therefore, we designed this study to explore the prevalence, severity, nutritional status and malnutrition risk factors in SSc at Srinakarin University Hospital, Thailand.

Methods

Study design and population

This study was a non-randomized cross-sectional study conducted in the scleroderma clinic at Srinakarin university hospital between 2011-2012. After obtaining informed consent, patients were followed up in the next two months for a venous blood sample and evaluation of nutritional status by asking for a history and performing a physical exam.

Patient selection

Inclusion criteria in this study include patients older than 15, SSc diagnosed by The American College of Rheumatology criteria in 1980, and patients followed up in the SSc clinic at Srinakarin University Hospital. Overlapping syndrome or mixed connective tissue disease was excluded.

Ethical procedure

The present study was approved by the research ethics committee of KKU (HE541170). Written informed consent was obtained from all subjects.

Operational definitions

Subjective global assessment (SGA) scoring (14-16) was used in this study. It included medical history and physical examination. A part of medical history includes weight change, dietary intake, gastrointestinal symptoms (persistent for >2 weeks) and functional impairment. Another part of the physical examination includes muscle wasting, subcutaneous fat loss, and edema. The severely malnourished (SGA class C) rating is given whenever a patient has physical signs of malnutrition, such as severe loss of subcutaneous fat, severe muscle wasting, or edema, in the presence of a medical history suggestive of risk, such as continuing weight loss with a net loss of 10% or more or a decline in dietary intake. GI symptoms and functional impairments usually exist in these patients. The mildly or moderately malnourished (SGA class B) rating is classified when weight loss is 5-10% with no subsequent gain, combined with mild subcutaneous fat or muscle loss and a reduction in dietary intake. These patients may or may not exhibit functional impairments or GI symptoms. Suppose the patient has no physical signs of malnutrition, significant weight loss, dietary difficulties, nutritionally related functional impairments, or GI symptoms that might predispose to malnutrition. In that case, they will be classified in the well-nourished (SGA class A) rating.

Nutritional status was classified into three groups. First, SGA class A and/or body mass index (BMI) > 18.49 Kg/m2 were not malnutrition. Second, malnutrition was SGA class B or C and/or BMI ≤ 18.49 Kg/m^2. Third, severe malnutrition was SGA class C and/or BMI < 16.00 Kg/m^2.

About history and physical examination collection, patients were asked and examined. Limited mouth opening meant that the patient could not open a normal mouth. The limitation of hand function meant the patient could not use both hands in any activity. They were compared with before the diagnosis of SSc. A vernier caliper was used to evaluate the oral aperture. It is measured at the incisor.

Statistical analysis

Qualitative data and variables were shown in frequency and percentage. Quantitative data and variables were shown in mean, standard deviation and parametric tests were used. Non-normal distribution was shown in the median and range, and a non-parametric test was used. The association between each factor and nutritional status in SSc was analyzed using binary logistic regression. P-values of <0.05 were considered significant. All data analyses were performed using STATA version 11.2 (StataCorp., College Station, TX, USA).

Results

This study included a total of 73 SSc patients. Numbers of female and male patients were 59 (80.82%) and 14 (19.18%), respectively. The mean age was 51.33 (±10.65) years old. Characteristic data of SSc patients is summarized in Table 1. About BMI, BMI ≥ 18.50Kg/m^2, BMI 17.50-18.49 Kg/m^2, BMI 16.0-17.49 Kg/m^2 and BMI <16 Kg/m^2 were 80.83%, 8.21%, 6.85% and 4.11%, respectively. SGA, classified in classes A, B, and C, was 46.6%, 35.6% and 17.8%, respectively.

Table 1: Characteristic data of SSc patients

Characteristic data	
Sex (Female: male) (n) (%)	59:14
Mean age (year) (mean±SD)	51.33±10.65
Diffuse SSc: limited SSc (n) (%)	66:7
Duration of disease (year) (mean±SD)	3.68±3.98
Modified Rodnan skin score (MRSS) (mean±SD)	13±12
Oral aperture (cm) (mean±SD)	3.46±1.16
Family history of systemic sclerosis (n) (%)	6(8.22)
Body temperature (°C) (mean±SD)	36.99(0.27)
Systolic blood pressure (mmHg) (mean±SD)	117±16
Diastolic blood pressure (mmHg) (mean±SD)	71±10
Body weight (Kg) (mean±SD)	52.5±9.6
BMI (Kg/m^2) (mean±SD)	21.4±3.5
Anti Scl-70 positive (n) (%)	61(83.6)
Anti centromere positive (n) (%)	3(4.1)
Hemoglobin (g/dl) (mean±SD)	12.29±1.60
MCV (fL) (mean±SD)	82.86(11.22)
Blood urea nitrogen (BUN) (mg/dL) (mean±SD)	12.50±11.65)
Creatinine (mg%) (mean±SD)	0.68±0.23
Total protein (g/dL) (median; IQR)	7.9 (7.4-8.4)
Albumin (g/dL) (median; IQR)	4.2 (3.8-4.4)
Creatine Phosphokinase (CPK) (u/L) (median; IQR)	93 (64-133)

Regarding nutritional status (by definition in this study), SSc patients who did not have malnutritional status were 34 (46.58%). Figure 1 shows the nutritional status in this study. In the malnutrition group, severe malnutrition, which was SGA class C or BMI < 16.00 Kg/m^2, was 13 (17.81%) patients in a total of 73 SSc patients. Therefore, the prevalence of malnutrition and severe malnutrition was 53.4 % (41.4-65.2) and 17.8% (9.8-28.5), respectively.

The risk factors of malnutrition and severe malnutrition in SSc are shown in Table 2-3. Although multivariate analysis showed no significant risk factor in the malnutrition group, the severe malnutrition group showed that difficulty chewing and dental carries were significant. Although the disease duration was not statistically significant, diseases with more than five years of duration tended to be significant in the severe malnutrition group compared with diseases with a duration of less than five years (p=0.051).

Table 2: Risk factor in no malnutrition and malnutrition/severe malnutrition.

	No malnutrition N = 34 (%)	Malnutrition N = 39 (%)	Univariation analysis		Multivariation analysis	
			OR (95% CI)	P value	OR (95% CI)	P value
Female	29 (85.3)	30 (76.9)	0.57 (0.14-2.20)	0.36		
Age (years); mean (±SD)	51.9 (±10.0)	50.8 (±11.3)	-	0.67		
Diffuse SSc	29 (85.3)	37 (94.9)	3.19 (0.47-35.23)	0.17		
Weight loss	3 (8.8)	28 (71.8)	26.30 (5.99-152.69)	<0.01		
Difficult chew	8 (23.5)	23 (60.0)	4.67 (1.53-14.86)	<0.01	1.71 (0.39-7.46)	0.71
Poor appetite	10 (29.4)	16 (41.0)	1.67 (0.57-5.01)	0.30		
Limit mouth opening	11 (32.4)	28 (71.8)	5.32 (1.76-16.39)	<0.01	1.76 (0.43-7.25)	0.43
Dental carries	6 (17.7)	14 (35.9)	2.61 (0.78-9.51)	0.08	2.43 (0.59-10.08)	0.22
Glossitis	7 (20.6)	25 (64.1)	6.89 (2.15-23.16)	<0.01	2.51 (0.52-12.14)	0.25
Dysphagia	11 (32.4)	26 (66.7)	4.18 (1.42-12.54)	<0.01	1.62 (0.44-6.35)	0.45
Nausea	5 (14.7)	12 (30.8)	2.58 (0.72-10.49)	0.11	1.15 (0.25-5.40)	0.86
Heartburn	16 (47.1)	17 (43.6)	0.87 (0.31-2.42)	0.77		
Dyspepsia	19 (55.9)	21 (53.9)	0.92 (0.33-2.56)	0.86		
Bloating and gas	14 (41.2)	25 (64.1)	2.55 (0.90-7.32)	0.05	2.69 (0.73-9.95)	0.14
Decrease bowel sound	1 (2.9)	16 (41.1)	22.96 (3.04-990.92)	<0.01	6.72 (0.60-75.11)	0.12
Constipation	6 (17.7)	15 (38.5)	2.92 (0.88-10.54)	0.05	2.29 (0.53-9.85)	0.27
Diarrhea	0 (0)	7 (18.0)	NA	<0.01		
Steatorrhea	0 (0)	0 (0)	NA			
Ascites	1 (2.94)	0 (0)	NA	0.28		
Edema	2 (5.9)	2 (5.1)	0.86 (0.06-12.59)	0.89		
Raynaud	31 (91.2)	34 (87.2)	0.66 (0.09-3.73)	0.59		
Ischemic ulcer	1 (2.9)	2 (5.1)	1.78 (0.09-108.37)	0.64		
Tendon friction rub	1 (2.9)	1 (2.6)	0.86 (0.01-70.21)	0.92		
Limitation of hand function	14 (41.2)	26 (66.7)	3.64 (1.24-10.86)	<0.01	0.94 (0.24-3.70)	0.93
Total MRSS skin score; median(IQR)	6 (2-9)	15 (8-27)	-	<0.01		
Oral aperture(cm); median(IQR)	4.0 (3.4-4.4)	2.9 (2.1-3.7)	-	<0.01		
ESR; median(IQR)	28 (16-44)	29 (18-46)	-	0.75		
CPK; median(IQR)	101 (65-145)	93 (54-132)	-	0.34		
Anti-SCL-70 positive	27 (79.4)	34 (87.2)	1.76 (0.42-7.83)	0.37		
Anti-centromere positive	2 (5.9)	1 (2.6)	0.42 (0.01-8.53)	0.48		

NA: Data not available

Table 3: Risk factor in no malnutrition/malnutrition and severe malnutrition

	No malnutrition /malnutrition N = 60 (%)	Severe malnutrition N = 13 (%)	Univariation analysis		Multivariation analysis	
			OR (95% CI)	P value	OR (95% CI)	P value
Female	47 (78.3)	12 (92.3)	3.32 (0.41-152.62)	0.25		
Age (years); mean (±SD)	52.3±10.5	46.7±10.6	-	0.08		
Diffuse SSc	53 (88.3)	13 (100)	NA	NA		
Limited SSC	7 (11.7)	0	NA	NA		
Weight loss	20 (33.3)	11 (84.6)	11 (2.04-107.78)	<0.01		
Difficult chew	19 (31.7)	12 (92.3)	25.89 (3.25-1132.86)	<0.01	132.93 (1.88-9378.72)	0.02
Poor appetite	19 (31.7)	7 (53.9)	2.52 (0.62-10.31)	0.13		
Limit mouth opening	27 (45.0)	12 (92.3)	14.67 (1.89-645.40)	<0.01	30.71 (0.75-1252.08)	0.70
Dental carries	14 (23.3)	6 (46.2)	2.82 (0.65-11.55)	0.09	113.31(1.46-8768.00)	0.03
Glossitis	22 (36.7)	10 (76.9)	5.76 (1.27-35.15)	<0.01	0.13 (0.003-4.18)	0.25
Dysphagia	26 (43.3)	11 (84.6)	7.16 (1.36-70.55)	<0.01	0.83 (0.49-13.93)	0.90
Nausea	11 (18.3)	6 (46.2)	3.82 (0.86-16.14)	0.03	0.68 (0.07-7.06)	0.75
Heartburn	25 (41.7)	8 (61.5)	2.24 (0.56-9.69)	0.19		
Dyspepsia	30 (50.0)	10 (76.9)	3.33 (0.75-20.39)	0.08	56.89 (0.33-9869.96)	0.33
Bloating and gas	30 (50.0)	9 (69.2)	2.25 (0.55-11.00)	0.21		
Decrease bowel sound	8 (13.3)	9 (69.2)	14.63 (3.03-77.21)	<0.01	7.77 (0.58-104.88)	0.12
Constipation	15 (25.0)	6 (46.2)	2.57 (0.60-10.46)	0.13		
Diarrhea	4 (6.7)	3 (23.1)	4.2 (0.52-28.48)	0.07	27.23 (0.52-1425.19)	0.10
Steatorrhea	0	0	NA	NA		
Ascites	1 (1.67)	0 (0)	NA	0.64		
Edema	3 (5.0)	1 (7.7)	1.58 (0.03-21.61)	0.7		
Raynaud	53 (88.3)	12 (92.3)	1.58 (0.17-77.29)	0.68		
Ischemic ulcer	2 (3.3)	1 (7.7)	2.42 (0.04-49.25)	0.47		
Tendon friction rub	2 (3.3)	0	NA	0.50		
Limitation of hand function	31 (51.7)	11 (84.6)	5.15 (0.98-50.68)	0.03	12.58 (0.25-643.36)	0.21
Total MRSS skin score; median (IQR)	7.5 (2-13.5)	27 (21-31)	-	<0.01		
Oral aperture (cm); median (IQR)	3.7 (3.1-4.2)	2.1 (1.9-2.3)	-	<0.01		
ESR; median (IQR)	28 (15.5-45.5)	31 (26-44)	-	0.38		
CPK; median (IQR)	93 (64.5-133.5)	127 (61-130)	-	0.78		
Anti SCL-70 positive	51 (85.0)	10 (76.9)	0.59 (0.12-4.00)	0.48		
Anticentromere positive	3 (5.0)	0 (0)	NA	0.41		

NA: Data not available

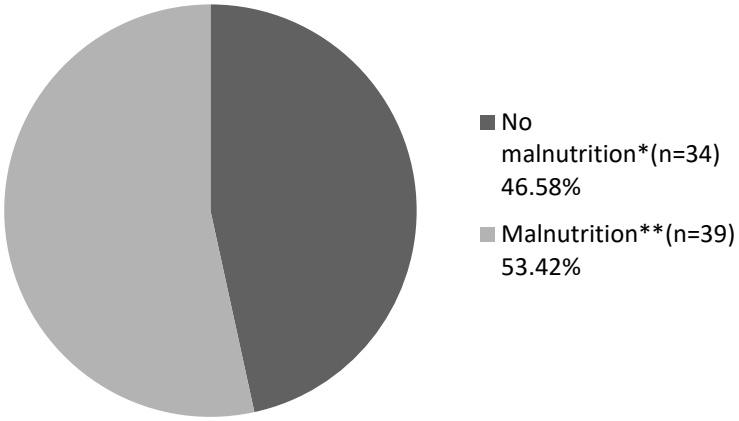

Figure 1 Nutritional status in SSc patients.
* SGA class A and/or BMI > 18.49 Kg/m^2
** SGA class B, C and/or BMI ≤ 18.49 Kg/m^2

Discussion

SSc is a complex autoimmune disease that can affect multiple organ systems. The disease is characterized by fibrosis and destruction of the microvasculature. Our study is the first to demonstrate the prevalence of nutritional status and risk factors in Thailand. Our study design used SGA and BMI to evaluate nutritional status because they were simple and easy in clinical practice. Although the evaluation method of nutritional status is different, the prevalence of malnutrition in our study was similar to that of Krause et al. (13).

Our findings might indicate that difficult chewing and dental carrying were risk factors in the severe malnutrition group. Most of the population in our study are diffuse SSc, but previous studies (12, 13) were limited SSc; therefore, this result differed from the previous ones.

Body weight is a component of SGA and BMI. In our study, most patients had diffuse SSc; therefore, the skin on the face was also involved, affecting chewing. Difficult chewing can affect patients' appetite and the absorption of nutrients. On the other hand, difficult chewing affects weight; therefore, an evaluation of SGA and BMI was also used in this study. Apart from difficult chewing, our study found that dental carries were another risk factor for severe malnutrition. Therefore, we assume that dental carriers had the effect of chewing, so this reason may be a risk of severe malnutrition in our study.

In limitation, although multiple risk factors were significant in univariate analysis, multivariate analysis did not find any significance in the malnutrition group because our study's sample size was small. On the other hand, Sjogren's disease affects the oral cavity, and this study did not evaluate Sjogren's disease, Anti-Ro/SSA and La/SSB antibodies, which were seen in SSc. Difficult chewing and dental carries may be affected by Sjogren's disease. We suggest that the next study researcher ought to evaluate Sjogren's disease.

In conclusion, malnutrition is high in the scleroderma clinic at Srinakarin University Hospital. Some have severe malnutrition. We suggest that difficult chewing and dental carries were risk factors for severe malnutrition. We also suggest that good oral hygiene might protect against severe malnutrition in SSc patients.

Conflict of interest

The authors have no conflicting interests.

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