ORIGINAL ARTICLE

# Dermatomyositis related to autoimmune thyroiditis

H. Wang,[†,‡] L. Tao,[‡] H. Li,[‡] J. Deng[†,*]

[†]Department of Geriatrics, West China Hospital, Sichuan University, Chengdu, Sichuan, and [‡]Department of Internal Medicine, Renming Hospital of Shiyan City, Hubei Medical University, Shiyan, Hubei, China

*Correspondence: J. Deng. E-mail: wh7967@gmail.com

## Abstract

**Background and objective** Reports on the coexistence of dermatomyositis (DM) with autoimmune thyroiditis (AIT) are very few. Our aim is to define the relationship of the two conditions, identify clinical, laboratory, electromyographic and pathologic features of coexistent DM and AIT.

**Methods** We underwent a MEDLINE search to identify relevant literature published in the past 30 years. Concurrently, we analysed retrospectively medical records of five patients diagnosed with DM and AIT from our hospital.

**Results** Eleven cases were included. 90.9% of patients were female with a mean (SD) age of 44.18 (13.11) years for DM at diagnosis, and 39.00 (7.81) years for AIT. AIT can precede or parallel the diagnosis of DM. The most common comorbidities included hypothyroidism (90.9%), cardiopulmonary diseases (63.7%) and overlap syndrome (27.3%), while only one case had malignancy. The most common clinical manifestations were: muscle weakness (100%), polyarthralgia (45.5%), heliotrope rash (45.5%), myalgia (36.4%), and Raynaud's phenomenon (27.3%). The abnormalities on electromyography and muscle/skin biopsy of DM related to AIT did not differ from those findings of DM, while none of these reports were normal. All patients received both the treatment of corticosteroids and levothyroxine, and only 27.3% of patients had a good prognosis.

**Conclusion** Prevalence of cancer in coexistent DM and AIT may be very low. Also, it is reasonable to suggest that DM patients with AIT should be routinely evaluated for thyroid function and the emergence of comorbidities. Moreover, corticosteroids combined with levothyroxine may be useful for these patients as a standard treatment.

Received: 14 July 2010; Accepted: 9 November 2010

## Keywords

autoimmune thyroiditis, autoimmunity, dermatomyositis, hypothyroidism

## Conflict of interest

None declared.

## Funding sources

No funding sources that supported the work.

## Introduction

Dermatomyositis (DM) is an autoimmune myopathy characterized clinically by cutaneous manifestations, proximal muscle weakness and muscle inflammation.[1,2] DM may occur with other systemic autoimmune diseases, such as progressive systemic sclerosis (PSS), mixed connective-tissue disease (MCTD) and systemic lupus erythematosus (SLE).[3,4] Recently, it has been generally accepted that autoimmune thyroiditis (AIT), an organ-specific autoimmune disease, may often become related to systemic autoimmune diseases, for instance, SLE, PSS and rheumatoid arthritis (RA).[5–7] However, the reports on the association of DM with AIT are very few, to our knowledge, the association between them has been reported in six cases.[8–12] From these limited evidences, a cross-linkage of autoimmune disease or a common genetic basis, may be present in these patients, although we can not exclude the possibility that the relationship represents a random finding. In addition, there is currently rare information regarding the clinical, laboratory, pathologic and electromyographic features of coexistent DM and AIT. In the present study, we have evaluated medical records of five patients diagnosed with DM and AIT from our hospital, and provided a summary of the findings of DM with AIT in additional six cases reported in the past 30 years, with the aim of identifying common characteristics that might elucidate a possible relationship of the two conditions.

## Methods

We performed a MEDLINE search with the subject headings, test words or abstracts 'dermatomyositis', 'thyroid$', 'hypothyroidism', and 'hashimoto' to identify relevant literature published from the period of 1 January 1986 through 31 March 2010, accessed through OVID and checked the references of published studies to identify additional studies. In addition, we retrospectively evaluated medical files of five patients diagnosed with DM and AIT from our hospital (Table 1).

Our inclusion criteria were in accord with the following standards: (i) Diagnosis of DM was confirmed according to criteria of Bohan and Peter;[1] (ii) Diagnosis of AIT was based on clinical symptoms, signs, laboratory data, ultrasound or biopsy findings; (iii) Reports included had no language and race restriction. Patients with juvenile DM were excluded and if we could not get more information from reports published in non-English, they were also excluded.

Additionally, prognosis of patients was defined as complete recovery (patient totally recovered without evidence of active disease), partial recovery (evidence of clinical improvement short of a complete clinical response), or no recovery (relapse or death or with evidence of aggravated disease) by us.

## Results

A total of 11 patients[8–12] who met our criteria were included. Two patients were excluded because of insufficient data,[13,14] and one case with juvenile DM and subclinical hypothyroidism was also excluded.[15] The features of all patients included are shown in Tables 2 and 3.

### Gender and age

Among the 11 patients who were included in the cohort the majority (90.9%) were female and the mean (SD) age of DM at diagnosis was 44.18 (13.11) years (range 28–49 years), while the mean (SD) age of AIT at diagnosis was 39.00 (7.81) years with the range from 26 to 50 years (Table 4).

### Protopathies and comorbidities

All patients were diagnosed as having DM according to the criteria of Bohan and Peter. Clinical manifestations, laboratory data and findings of ultrasound or biopsy confirmed the diagnosis of AIT (Table 3). Ten patients (90.9%) had hypothyroidism, of which three had a personal history of partial thyroidectomy due to nodular goitre. Other common comorbidities appeared to be cardiopulmonary diseases including interstitial lung disease (36.4%), and myocardial diseases (27.3%) such as enlargement of left heart, tachyarrhythmia, pericardial effusion and T wave changes. In addition, non-Hodgkin's lymphoma and overlap syndrome associated with DM occurred in one patient and three patients, respectively (Table 4).

**Table 1** The results of the Medline search

| | Search Strategy (Ovid MEDLINE: 1950–2010) |
|---|---|
| 1 | Dermatomyositis/(5603) |
| 2 | Dermatomyositis.tw. or dermatomyositis.ab. (5111) |
| 3 | Thyroid$.tw. or thyroid$.ab. (119431) |
| 4 | Hypothyroidism.ab. or hypothyroidism.tw. (18861) |
| 5 | Hashimoto.ab. or hashimoto.tw. (912) |
| 6 | 1 or 2 (6715) |
| 7 | 3 or 4 or 5 (127942) |
| 8 | 6 and 7 (62) |
| 9 | Limit 8 to year = '1980–2010' (58) |

### Clinical manifestations

The various clinical manifestations were described to the cohort. Complaints of proximal muscle weakness were present in all patients. Of these patients, polyarthralgia, muscle pain and dysphagia were reported in five, four, and two patients (45.5%), respectively. The most common characteristic cutaneous manifestations reportedly included heliotrope rash (45.5%) and Gottron's sign (18.2%). Other cutaneous manifestations were: Raynaud's phenomenon (18.2%), shawl sign (9.1%), periungual erythema (9.1%), and vasculitis (9.1%). In addition, non-specific erythema on skin was reported in all patients (Table 4).

### Laboratory analyses

In the series of patients, all patients had elevated serum creatine phosphokinase (CK) value. Other muscle enzymes including lactate dehydrogenase (LDH), aspartate aminotransferase (AST), alanine transaminase (ALT) and aldolase were also reported to be elevated in some cases. Markers of inflammation action, namely erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP), were found to be elevated in four cases and in one case, respectively. Most of these patients had abnormal titres of anti-thyroid peroxidase antibody (TPOAb), anti-thyroglobulin antibody (TGAb), and anti-microsomal antibody (TMAb). Five cases (45.5%) had positive anti-nuclear antibody (ANA) and positive rheumatoid factor (RF) was also found in three cases (27.3%). Moreover, our cohort also showed high titres of serum immunoglobulins including IgG, IgA, IgE and IgM present in three, three, two, and two cases, respectively (Table 5).

### Electromyography

Electromyography was performed in all patients but not reported in three cases at length. Eight cases (72.7%) were reported as having polyphasic motor unit potentials of low amplitude and short duration, fibrillation waves, positive sharp waves and insertional irritability compatible with DM, while no case exhibited normal electromyography (Table 5).

### Biopsy

All patients received muscle biopsy, but data from two patients were unavailable. No case exhibited normal biopsy as well as electromyography. Of nine cases (81.8%) with abnormalities, the most

**Table 2** Characteristic of patients with dermatomyositis and autoimmune thyroiditis

| Ref | Gender | Year at diagnosis of DM/TD | Comorbidities | Symptoms | Laboratory examination | Electromyography | Biopsy | Treatment | Outcome |
|---|---|---|---|---|---|---|---|---|---|
| Ref 8 | M | DM/50; HT/49 | No | Muscle weakness, dysphagia, heliotrope rash, Gottron's papules, periungual erythema, Raynaud's phenomenon | TMAb(+), TGAb(+) and ANA(+); elevated TSH, reduced FT4; elevated CK, AST, LDH | Diffusely abnormalities with fibrillations, insertional irritability, positive sharp waves, and short-duration action potentials. | Perifascicular atrophy with lymphatic infiltration of perifascicular collagen, muscle fascicle necrosis of type 1 and type 2 fibres | Cs/L-thyroxine | Recovery |
| Ref 9 | F | DM/59; HT/48 | Nodular goitre (thyroidectomy) | Muscle weakness, myalgia, heliotrope rash, Gottron's papules | TMAb(+), TGAb(+); normal TSH, FT4; elevated ESR, CPK, LDH | NA | Perifascicular atrophy with lymphatic infiltration (muscle). Flattening of epidermis, oedema of the basal layer and dermis, and mononuclear cell infiltration (skin) | Cs | Recovery |
| Ref 10 | F | DM/30; HT/28 | Nodular goitre (thyroidectomy) | Muscle weakness, polyarthralgia, myalgia | TMAb(+), TGAb(+), ANA(+), and IgG/IgA/IgM(+); elevated TSH, reduced FT4; elevated CK, AST, LDH, ESR | Myopathic and neurologic abnormalities with fibrillation, polyphasic motor unit potentials of low amplitude and short duration | Necrotic and regenerating fibres as well as perivascular and interstitial mononuclear cell infiltration | Cs/L-thyroxine | Recovery |
| Ref 11a | F | DM/40; HT/40 | NA | NA | Elevated TSH, reduced FT4 | NA | NA | Cs/L-thyroxine/ AZA | Relapse |
| Ref 11b | F | DM/26; Hypo, HT/31 | Non-Hodgkin's lymphoma | NA | TPOAb(+), TGAb(+); elevated TSH, reduced FT4 | NA | NA | Cs/L-thyroxine IVIg, MTX/AZA | Relapse |
| Ref 12 | F | DM/59; Hypo, HT/35 | Mucous colitis, SS, dermatitis herpetiformis | Muscle weakness, polyarthralgia, | TGAb(+), TPOAb(+) and IgA/IgG(+); elevated TSH, reduced FT4; elevated CK | Myopathic pattern | Inflammatory and degenerative changes | Cs/L-thyroxine | Partial recovery |
| Case 1 | F | DM/65; Hypo, HT/45 | Respiratory failure, ILD, right bundle-branch block | Muscle weakness, polyarthralgia | TGAb(+), TPOAb(+) and AKA(+); elevated TSH, reduced FT4/FT3; elevated AST, CK, ALT, LDH, HBDH, | Myopathic abnormalities with fibrillation, polyphasic motor unit potentials of low amplitude and short duration | Lymphatic infiltration and fibre necrosis (muscle). Parakeratosis and hyperkeratinization of epidermis (skin) | Cs/L-thyroxine | Death |

**Table 2** *Continued*

| Ref | Gender | Year at diagnosis of DM/TD | Comorbidities | Symptoms | Laboratory examination | Electromyography | Biopsy | Treatment | Outcome |
|---|---|---|---|---|---|---|---|---|---|
| Case 2 | F | DM/33; Hypo, HT/30 | SLE, ILD, sinus bradycardia, T wave change | Muscle weakness, polyarthralgia, heliotrope rash, Raynaud's phenomenon, vasculitis | TGAb(+), TPOAb(+), ACA(+) and RF(+); elevated TSH, reduced FT4/FT3; elevated AST, ALT, CK, LDH, HBDH, ESR | Polyphasic motor unit potentials of low amplitude and short duration | Variation of fibre size, fibre necrosis, and lymphatic infiltration of perifascicular collagen (muscle). Hyperkeratinization and atrophy of epidermis, lymphatic infiltration of small vessels in superficial layer (skin) | Cs/L-thyroxine/ MTX | Partial recovery |
| Case 3 | F | DM/34; Hypo, HT/34 | SLE, SS, left heart enlargement, hydropericardium | Muscle weakness | TGAb(+), TPOAb(+), SS antibody(+); Rib(+) IgE(+) and ANA(+); elevated TSH, reduced FT4/FT3; elevated ESR, AST, ALT, CK, LDH, HBDH | Polyphasic motor unit potentials of low amplitude and short duration | Lymphatic infiltration and fibre size variation | Cs/L-thyroxine/ CTX | Partial recovery |
| Case 4 | F | DM 49, Hypo, HT48 | ILD | Muscle weakness, polyarthralgia, myalgia, heliotrope rash | TGAb(+), IgG/IgA/ IgM/IgE(+), TPOAb(+), ANA(+) and RF(+); elevated TSH, reduced FT4/FT3; elevated AST, ALT, CK, LDH, HBDH | Short duration, low amplitude potentials | Muscle fascicle and atrophy necrosis of type 1 and type 2 fibres, and inflammatory | Cs/L-thyroxine | Partial recovery |
| Case 5 | F | DM 41, Hypo, HT41 | ILD, nodular goitre (thyroidectomy) | Muscle weakness, myalgia, heliotrope rash, shawl sign | TGAb(+), TPOAb(+), ANA(+), RF(+) and CCP(+); elevated TSH, reduced FT4/FT3; elevated CRP, AST, ALT, CK, LDH, HBDH | Abnormal fibrillations, insertional irritability, polyphasic motor unit potentials of low amplitude and short duration | Necrotic and regenerating fibres as well as perivascular and lymphocytes cell infiltration | Cs/L-thyroxine/ MTX | Partial recovery |

ACA, anti-centromere antibody; AKA, anti-keratin antibody; ALT, alanine transarninase; ANA, anti-nuclear antibody; AST, aspartate aminotransferase; AZA, acetazolamide; CK, serum creatine phosphokinase; CRP, C-reactive protein; Cs, corticosteroids; CTX, cyclophosphamide; DM, dermatomyositis; ESR, erythrocyte sedimentation rate; FT3, free triiodothyronine; FT4, free thyroxine; HBDH, hydroxybutyrate dehydrogenase; HT, hashimoto's thyroditis; Hypo, hypothyroidism; ILD, interstitial lung disease; LDH, lactate dehydrogenase; MTX, methotrexate; NA, no available; RF, rheumatoid factor; SLE, systemic lupus erythematosus; SS, sjogren's syndrome; TGAb, anti-thyroglobulin antibody; TMAb, anti-microsomal antibody; TPOAb, anti-thyroid peroxidase antibody; TSH, thyroid-stimulating hormone.

**Table 3** Characteristic of thyroid files from patients included

| | TSH | FT4 | FT3 | TGAb | TMab | TPOAb | Thyroid ultrasonography | FNA |
|---|---|---|---|---|---|---|---|---|
| Ref 8 | ↑ | ↓ | NA | ↑ | ↑ | NA | TRAIU: at 5 h was 4.2% and at 24 h was 10.6%* | NA |
| Ref 9 | – | – | – | ↑ | ↑ | NA | Not increased* | NA |
| Ref 10 | ↑ | ↓ | NA | ↑ | ↑ | NA | TRAIU: at 2 h was 6.8% and at 24 h was 15.6%* | Lymphocytic infiltration and oxyphilic change of follicular epithelium |
| Ref 11a | ↑ | ↓ | NA | NA | NA | NA | NA | NA |
| Ref 11b | ↑ | ↓ | NA | ↑ | NA | ↑ | Hypoechogenic thyroid gland | NA |
| Ref 12 | ↑ | ↓ | NA | ↑ | NA | ↑ | Hypoechogenic thyroid gland | NA |
| Case 1 | ↑ | ↓ | ↓ | ↑ | NA | ↑ | Hypoechogenic thyroid gland | No |
| Case 2 | ↑ | ↓ | ↓ | ↑ | NA | ↑ | Hypoechogenic thyroid gland | Lymphocyte infiltration and fibroplasia |
| Case 3 | ↑ | ↓ | ↓ | ↑ | NA | ↑ | Hypoechogenic thyroid gland | No |
| Case 4 | ↑ | ↓ | ↓ | ↑ | NA | ↑ | Hypoechogenic thyroid gland | No |
| Case 5 | ↑ | ↓ | ↓ | – | ↑ | – | Hypoechogenic thyroid gland | Lymphocyte infiltration, fibroplasia and oxyphilic change |

*The results of thyroid ultrasonography were unavailable, and results from TRAIU were available.
↑, elevated; ↓, reduced; –, normal; FNA, fine needle aspiration for thyroid gland; FT3, free triiodothyronine; FT4, free thyroxine; NA, no available; TGAb, anti-thyroglobulin antibody; TSH, thyroid-stimulating hormone; TMAb, anti-microsomal antibody; TPOAb, anti-thyroid peroxidase antibody; TRAIU, thyroid radioactive iodine uptake.

**Table 4** Clinical features of dermatomyositis patients with autoimmune thyroiditis

| Characteristic | Number |
|---|---|
| Gender | |
| Female | 10 (90.9%) |
| Male | 1 (9.1%) |
| Age | |
| DM at diagnosis | 44.18 ± 13.11 years (28–49) |
| AIT at diagnosis | 39.00 ± 7.81 years (26–50) |
| Comorbidities | |
| Hypothroidism | 10 (90.9%) |
| Nodular goitre | 3 (27.3%) |
| ILD | 4 (36.4%) |
| Cardiac involvement | 3 (27.3%) |
| Overlap syndrome | 3 (27.3%) |
| Cancer | 1 (9.1%) |
| Clinical manifestation | |
| Muscle weakness | 11 (100%) |
| Myalgia | 4 (36.4%) |
| Polyarthralgia | 5 (45.5%) |
| Dysphagia | 2 (18.2%) |
| Heliotrope rash | 5 (45.5%) |
| Gottron's sign | 2 (18.2%) |
| Shawl sign | 1 (9.1%) |
| Periungual erythema | 1 (9.1%) |
| Raynaud's phenomenon | 2 (18.2%) |
| Vasculitis | 1 (9.1%) |

AIT, autoimmune thyroiditis; DM, dermatomyositis; ILD, interstitial lung disease.

common abnormal findings were inflammatory infiltrate, variation of fibre size variation, fibre necrosis, and fibre atrophy. Besides these, four cases (36.4%) underwent skin biopsy, whose findings included hyperkeratesis, parakeratosis, epidermal atrophy, squamous epithelium proliferation and sparse infiltrate of inflammatory cells at the dermoepidermal junction (Table 5).

### Treatment and recovery

All patients received the treatment of corticosteroids (prednisolone or prednisone). Additional immunosuppressive agents, such as methotrexate (three cases), azathioprine (two cases), and cyclophosphamide (one case), were administrated for DM. Ten hypothyroidism patients were concurrently treated with levothyroxine. Additionally, three cases underwent partial thyroidectomy due to nodular goitre before the diagnosis of DM was established (Table 5).

No recovery, consisting of relapse and death, was observed in three cases (27.3%), and normalization of serum CK, or other serum muscle enzyme or remission of clinical situation was found in five cases (45.5%). Only three cases (27.3%) had a good recovery (Table 5).

## Discussion

Dermatomyositis (DM) has been reported in association with various autoimmune and connective tissue diseases. However, there is relatively less information available regarding the coexistence of DM and autoimmune thyroiditis (AIT). Authors of a recent study stated that 1.2% of idiopathic inflammatory myopathy patients,

**Table 5** Results of laboratory examination, electromyography, biopsy, treatment and prognosis in dermatomyositis patients with autoimmune thyroiditis

| Test | Number |
|---|---|
| Laboratory examination | |
| Elevated CK | 11 (100%) |
| Positive TPOAb | 6 (54.5%) |
| Positive TGAb | 9 (81.8%) |
| Positive TMAb | 4 (36.4%) |
| Positive ANA | 5 (45.5%) |
| Positive RF | 3 (27.3%) |
| Positive IgG | 3 (27.3%) |
| Positive IgA | 3 (27.3%) |
| Positive IgE | 2 (18.2%) |
| Positive IgM | 2 (18.2%) |
| Elevated ESR | 4 (36.4%) |
| Elevated CRP | 1 (9.1%) |
| Electromyography | |
| No available | 3 (27.3%) |
| Normal | 0 (0%) |
| Myopathic pattern | 8 (72.7%) |
| Muscle biopsy | |
| No available | 2 (18.2%) |
| Normal | 0 (0%) |
| Compatible with DM | 9 (81.8%) |
| Skin biopsy | |
| No available | 2 (18.2%) |
| Not performed | 6 (63.6%) |
| Compatible with DM | 3 (18.2%) |
| Treatment | |
| Corticosteroids | 11 (100%) |
| ISA | 5 (45.5%) |
| Levothyroxine | 10 (90.9%) |
| Partial thyroidectomy | 3 (27.3%) |
| Prognosis | |
| No recovery | 3 (27.3%) |
| Partial recovery | 5 (45.5%) |
| Recovery | 3 (27.3%) |

ANA, anti-nuclear antibody; CK, serum creatine phosphokinase; CRP, C-reactive protein; DM, dermatomyositis; ESR, erythrocyte sedimentation rate; ISA, immunosuppressive agents; RF, rheumatoid factor; TGAb, anti-thyroglobulin antibody; TMAb, anti-microsomal antibody; TPOAb, anti-thyroid peroxidase antibody.

mainly DM, were affected by AIT.[16] Similar to the group mentioned above, the incidence of AIT was approximately 1.8% per each 100 DM patients in a prospective study with twenty-year follow-up.[11] Notably, in the recent retrospective study of 170 patients with newly diagnosed AIT, three patients (1.8%) were diagnosed with DM/polymyositis (PM) at onset of diagnosis.[16] However, data concerning the prevalence of coexistent DM and AIT in the general population is still unclear because of lack of data available.

According to information available in the past 30 years, a common etiopathogenesis may be suitable as an explanation for coexistent DM and AIT. Proposed mechanisms included: shared environmental factors such as virus, a drug or a chemical, triggering both autoimmune thyroid disease and DM;[17] cross reactivity of anti-thyroid autoantibodies or autoreactive T cells with other tissues and organs or that of other autoantibodies with thyroid antigens may lead to disease the overlaps;[18] cytokine imbalance may also account for the development of such overlaps. In addition, genetic link between anti-thyroid autoimmunity and the susceptibility to autoimmune disease can play a crucial role. For example, HLA-DRB1*04 antigen in patients with coexistent DM and AIT was present at a much higher frequency than would be expected in the general population.[11]

DM and AIT often occur in young or middle-aged women; this was also confirmed in our cohort. It is very interesting, however, that AIT usually occurred before or within 3 years of DM diagnosis, most commonly in the first year after diagnosis. Thus, it is reasonable to suggest that patients with AIT should be routinely evaluated for the emergence of DM, especially in the first year.

Many large studies have confirmed the utility of measuring thyroid autoantibodies as predictors of future autoimmune hypothyroidism.[19] In our review, 90.9% of patients developed hypothyroidism, and hypothyroidism due to partial thyroidectomy occurred in 30% of these patients. DM may only overlap with PSS and MCTD, and not occur together with SLE.[2] However, high prevalence of SLE in DM/AIT patients was noticed,[16] which was also confirmed in our cohort.

The prevalence of interstitial lung disease (ILD), 36.4% in our group, is close to that in earlier retrospective studies.[20,21] Recently, in a prospective study of 17 patients diagnosed with DM/PM who were investigated by radiograph/high-resolution computerized tomography (HRCT) of the lungs and pulmonary function tests (PFT), 11 patients (64.7%) were diagnosed with ILD at onset of diagnosis.[22] This is not surprising because the incidence of ILD will increase with utilization of some sensitive diagnostic methods such as HRCT, PFT and bronchoalveolar lavage (BAL);[23] what is more, longitudinal analyses may demonstrate a true incidence of ILD, regardless of small samples. On the basis of these findings, careful evaluation of lung involvement using PFT and HRCT should be required after diagnosing DM. Surprisingly, anti-Jo1 antibodies, reportedly the most common laboratory sign associated with ILD, were not found in our cohort. The explanation for this remains unknown.

Subclinical cardiac involvement, mainly including conduction abnormalities, is much more common than clinically manifest heart problems in DM and electrocardiogram (ECG) changes are the most common.[24] However, frequency of abnormalities on ECG in DM is truly uncertain due to the absence of controlled studies. In our cohort, 27.3% of patients suffering from subclinical cardiac problems were found, which is lower than the 32% of patients described with this problem in a previous report.[25] This is a strange phenomenon because hypothyroidism has been used as a predictor of cardiovascular diseases and was associated with

several cardiovascular risk factors,[26] thus higher frequency of cardiac involvement should be present in our cohort. Four possible hypotheses were considered by us. Firstly, the previous study included PM rather than DM, and whether the incidence of cardiac involvement of PM is different from that in DM is uncertain. Secondly, subclinical cardiac involvement of reports included was often neglected by clinicians because those abnormalities on ECG appeared to be unimportant compared to overt cardiac manifestations such as congestive heart failure and coronary heart disease, which were reported as causes of death in myositis.[27] Thirdly, long-term follow-up may be needed for these patients. In addition to these, echocardiography, enhanced magnetic resonance imaging and even endomyocardial biopsies may be helpful in combination with clinical assessment and ECG tests.

DM was strongly associated with malignant disease, especially ovarian, lung, pancreatic, gastrointestinal and non-Hodgkin lymphoma, and the highest risk of these malignancies often occurred at the time of DM diagnosis.[28] In our cohort, only one case (9.1%) suffered from non-Hodgkin lymphoma. However, this is not surprising because a lower incidence of cancers, such as head and neck cancers and breast carcinoma, has been associated with hypothyroid patients in several previous studies,[29,30] although hypothyroidism might be a possible risk factor for cancers.[31,32] Recently, clinical and experimental evidence also demonstrated that loss of expression and/or function of the thyroid hormone receptors could lead to the selective advantage for tumour onset and development.[33]

Authors have proposed that amyopathic and myopathic DM were part of the range of DM affecting skin and muscle to a varying degree,[3] however, amyopathic dermatomyositis was not found in our group. As reported previously, myalgia may occur in less than 30% of DM patients and polyarthralgia affected approximately 40% of these patients.[3,34] Dysphagia, which can be caused by involvement of the oropharyngeal striated muscles and upper oesophagus muscles, was estimated to be present in 15–50% of patients, and it may be more frequent when DM patients had an overlap with scleroderma and other autoimmune diseases.[35] However, in contrast to our study, 36.4%, 45.5% and 18.2% of patients were described as having myalgia, polyarthralgia and dysphagia, respectively. In fact, the prevalence rates of abnormal myopathic manifestations in our cohort were found to be slightly higher than the data reported previously. These differences might be explained by a possible overlap between DM and some autoimmune rheumatic diseases, a role of autoantibodies characteristics of AIT, and a systemic inflammatory reaction associated with thyroditis,[36,37] because a variety of rheumatic manifestations, such as muscle weakness, muscle pain, polyarthralgia, and arthritis, have also been described in association with AIT.[37] Besides these findings, the prevalence of heliotrope rash in our patients was high (45.5%), and similar to that reported earlier.[34] Likewise, it is reported that Raynaud's phenomenon (RP) had an overall prevalence in the individuals with DM of approximately 10–20%,[34,38] in comparison with those studies reportedly, RP occurred in 18.2% of patients in the present study, which is similar to the prevalence of this symptom in the general population.

It's well known that inflammation activity of some autoimmune diseases is often associated with ESR, C-reactive protein (CRP), or serum immunoglobulin (Ig) such as IgE, IgA, IgM and IgG. In our cohort, ANA/RF-positive patients had often abnormal titres of those indictors. What is more, frequencies of ANA in our group were higher than that reported in the past.[39] Two hypotheses may be proposed. Firstly, the specificity of ANA and RF was limited since they were usually found in patients with other autoimmune diseases, infectious diseases, and to some extent in the healthy individuals. Secondly, patients with AIT had high prevalence of autoantibody against not only thyroid-specific but also non-thyroid-specific components such as ANA.[40] Additionally, it should be noted that the presence of high titles of RF, as well as altered thyroid-stimulating hormone (TSH), may interfere with the evaluation of thyroid autoantibodies,[41,42] which will lead to bias.

Regarding the electromyography and muscle biopsy, our results seemed to be consistent with the previous conclusions drawn by other authors.[1–3] For example, abnormalities on electromyography included short duration, low amplitude and polyphasic motor units, high-frequency discharges, fibrillation waves, positive sharp waves and increased insertional activity. Similarly, the most common findings of muscle biopsy included inflammatory infiltrate, variation of fibre size, fibre necrosis and atrophy compatible with myositis. Additionally, it may be unnecessary to perform routine skin biopsies to confirm the diagnosis of DM, especially since the pathologic changes – including hyperkeratesis, parakeratosis, epidermal atrophy, squamous epithelium proliferation, and sparse infiltrate of inflammatory cells – not specific for DM and can also be seen in lupus erythematosus.[2] It is to be noted, however, that cutaneous necrosis and/or vasculitis may be helpful clinical signs predictive of cancer in adult DM.[43,44]

Most patients received both corticosteroids and levothyroxine. However, improvement was obtained only after diagnosis and correction of thyroid dysfunction.

On the basis of limited information available, the major disease-specific factors affecting survival of DM were older age, involvement of cardiopulmonary diseases, and the presence of dysphagia and a malignancy.[45,46] In our study, the majority (73%) had a poor prognosis, and each patient had one or more of risk factors mentioned above. In addition, the poor prognosis in DM patients with AIT may be related to the combination of these two disease states.

The current study has some limitations that deserve mention. Firstly, the results may be exaggerated on account of small sample sizes available; secondly, missing data from included patients may lead to the unlikelihood or imperfection of our results. In addition, other systemic autoimmune disease, such as SLE and PSS, may interfere with production of thyroid hormone.

In conclusion, coexistent DM and AIT is very rare, and may share a common etiopathogenisis. AIT may occur before or at the same time as the diagnosis of DM. Due to role of thyroid hormones or thyroid-specific autoantibodies, the presence of manifestations of joint and muscle, positive ANA/RF, and abnormalities on electromyography and muscle biopsy may be more common, while malignancies associated with DM may be less common in these patients. Meanwhile, more sensitive tests may be helpful for the diagnosis of ILD and cardiac involvement. Finally, corticosteroids combined with levothyroxine may be useful for DM/AIT overlap patients as a standard treatment.

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