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Attitude Towards the Use of Mechanical Diagnosis and Therapy and Reliability of Classification Extremity Problems by Credentialed Therapists



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Abstract

Objective: The purpose of this study was to investigate attitudes towards Mechanical Diagnosis and Therapy (MDT) for extremity problems and inter-examiner reliability of classifying extremity problems into MDT subgroups by credentialed practitioners in MDT (Cred.MDT) in Japan.

Methods: A cross-sectional survey was used and all 120 Cred.MDT practitioners registered in the McKenzie Institute International Japan branch were asked about their attitude towards MDT for extremity problems and were asked to select the most appropriate MDT subgroup for each of the 25 extremity patient vignettes. Model classifications were used to investigate accuracy of classification. Percent agreement and Kappa analyses were examined.

Results: Sixty practitioners (50%) participated in this study. For the management of patients with extremity problems, the majority did not use MDT most of the time (53%) due to a lack of confidence in using MDT in the extremities (78%). The overall accuracy for their MDT classification for extremity problems was 87% (Fleiss's $\kappa = 0.78$).

Conclusions: The majority of the Cred.MDT practitioners in Japan did not use MDT frequently and were not confident to use MDT with extremity patients. However, accuracy and inter-examiner agreement of their MDT classification from the information on the assessment sheet was good.

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Introduction

Mechanical Diagnosis and Therapy (MDT) (ie, McKenzie approach)^{1–3} is a conservative treatment for musculoskeletal disorders including extremity

Table 1 Features of Diploma in Mechanical Diagnosis and Therapy (MDT) and Credential in MDT

	Requirement	Qualification
Credential in MDT	Completion of classroom training, including: <ul style="list-style-type: none"> ● Part A (lumbar spine): 28 hours ● Part B (cervical and thoracic Spine): 28 hours ● Part C (advanced lumbar spine and lower extremities): 28 hours ● Part C (advanced cervical and thoracic spine and upper extremities): 28 hours 	Minimum required level of clinical competency
Diploma in MDT	Passing of Credentialing examination (written tests and procedure tests): 1 day Attainment of Credential in MDT Completion of Diploma programs, including: <ul style="list-style-type: none"> ● 300 hours of E-learning about the principles related to MDT within musculoskeletal management, features of MDT in comparison to other manual therapy approaches, potential tissue responses associated with MDT, evidence-based clinical reasoning, and contraindications, precautions and limitations of the use of MDT ● 360 hours of man-to-man training (supervised patient treatments of various musculoskeletal disorders) 	Maximum required level of clinical competency
	Passing of Diploma examination: 1 day	

problems⁴⁻⁷ using classifications into subgroups through a systematic physical assessment. Formal and standardized training has been conducted in 32 countries throughout the world, including Japan. Therapists' education level is categorized into two levels; (1) MDT Credentialed therapists (Cred.MDT), which is supposed to confer a minimal level of knowledge and skills in using MDT; and (2) MDT Diploma therapists (Dip.MDT), which is the highest certification of MDT. While Cred.MDT practitioners could credential in the method having only studied the spinal components until 2013, Dip.MDT practitioners have more intensive training than Cred.MDT practitioners for various musculoskeletal disorders including extremity problems (Table 1).

In MDT, extremity problems are categorized into one of six subgroups: (1) Derangement, (2) Articular Dysfunction, (3) Contractile Dysfunction, (4) Posture, (5) Spinal, and (6) Other. Features of the four subgroups except the 'Spinal' and 'Other' are detailed in elsewhere.⁸ 'Spinal' means that the extremity problem is associated with spine. 'Other' means that the problem does not fit in any of the five subgroups and MDT may not be appropriate as an effective management for the complaint (e.g. trauma). It is important to identify an accurate subgroup corresponding to patient's symptomatic and mechanical presentation since management strategy is different in each subgroup.

In a previous study,⁸ inter-examiner agreement for the MDT classification corresponding to 25 extremity patient vignettes were investigated in Dip.MDT therapists. The study showed that 96% of the Dip.MDT practitioners used MDT for extremity patients all the time or most of the time. In addition, the overall agreement of corresponding classification was good (Fleiss's κ 0.83).⁹ However, the majority of practitioners using MDT clinical practice do not hold the Dip.MDT. Therefore the attitude towards MDT for extremity problems and inter-examiner classification reliability in the previous study⁸ may not be generalized to the majority of practitioners with Cred.MDT clinical practice. Thus, it was warranted to investigate the attitude towards MDT for extremity problems and inter-examiner classification reliability using the same patient vignettes in Cred.MDT practitioners.

The purpose of this study was to investigate Cred.MDT practitioners' attitude towards MDT for extremity problems and their classification inter-examiner reliability into MDT subgroups for patients with extremity problems from information on the MDT assessment sheet.

Methods

A national questionnaire survey with vignettes representing actual patients and established answers⁸

was conducted in Japan at January 2013. A previous study⁸ demonstrated high agreement of the classification for each vignettes between practitioners with Dip.MDT (% agreement = 68% - 97%), indicating face validity of the vignettes. Therefore, using the same vignettes allowed investigations of classification accuracy in Cred.MDT therapists and inter-examiner classification reliability between Cred.MDT therapists.

Participants

All 120 Cred.MDT practitioners (9 orthopaedic surgeons, 90 physiotherapists, 3 occupational therapists, 2 chiropractors, 15 judo-therapists and a training instructor) registered in the International McKenzie Institute Japan branch at January 2013, excluding two practitioners with Dip.MDT and two authors (HT and YI), were eligible for this study and were asked to participate in this study by email.

Ethical approval for the study was obtained from the Research Ethics Committee of the Society of Physical Therapy Science in Japan (SPTS2012004). All participants provided informed consent for their participation in this study.

Patient Vignettes

This study used the anonymous 25 extremity patient vignettes made from actual patients (8 Derangement, 5 Articular Dysfunction, 7 Contractile Dysfunction, no Posture, 3 Spinal, and 2 Other as shown in Appendix – available online).⁸ Twelve vignettes presented patients with upper limb problems (Vignettes 1, 4, 7, 8, 14, 16, 17, 20, 21, 22, 23, and 24) and 13 vignettes presented patients with lower limb problems (Vignettes 2, 3, 5, 6, 9, 10, 11, 12, 13, 15, 18, 19, and 25). This study used the same vignettes used in the previous study with no translation from English to Japanese although vignette's number was relabeled to avoid participants knowing the correct classification from the previous study.⁸ Each vignette had information regarding: 1) demographics, 2) pain location, 3) current and previous history, and 4) physical examination findings including active and passive movement testing, resisted testing and repeated movement responses. Participants were asked to choose the most appropriate MDT subgroup for each vignette from the following six subgroups: Derangement, Articular Dysfunction, Contractile Dysfunction, Posture, Spinal, or Other.

Demographic data and data of the attitude toward MDT for extremity problems were: (1) age, (2) years since qualifying as a practitioner (orthopaedic surgeon,

physiotherapist, occupational therapist, chiropractor, judo-therapist or training instructor), (3) years since qualifying as a Cred.MDT practitioner, (4) gender, (5) discipline, (6) proportions of workload for patients with extremity problems (1: <25%, 2: 25%-50%, 3: 50%-75%, 4: >75%). This study also investigated: (1) frequency of using MDT for extremity problem (0: almost never, 1: sometimes, 2: most of the time, 3: all the time), (2) confidence to utilize MDT for extremity problems (1: not confident, 2: relatively not confident, 3: relatively confident, 4: very confident), (3) a body part where the participant can derive positive therapeutic effects using MDT with the most confidence (shoulder, elbow, wrist, finger, hip, knee, foot), and (4) a body part where they can derive therapeutic effects using MDT with the least confidence (shoulder, elbow, wrist, finger, hip, knee, foot).

Data were obtained via an electronic survey from January 2013 to March 2013, with email reminders provided at two, four and six weeks after sending an invitation email. The survey was anonymous. Reasons for not participating in the study were provided voluntarily.

Accuracy of classification was examined by percent agreement with the model answer established in the previous study.⁸ The overall accuracy that was the mean of accuracy over the 25 vignettes, and the means of the accuracy in the 12 vignettes with upper limb complaint and the 13 vignettes with lower limb complaint were calculated. To investigate interexaminer agreement for the MDT classification, Fleiss's κ was calculated over the 25 vignettes, the 12 vignettes with upper limb problem and the 13 vignettes with lower limb problem. Evaluation criteria for the κ -value were: <0.4 = poor, 0.41-0.60 = moderate, 0.61-0.80 = good, 0.81-1.0 = very good.⁹ Statistical significance was set at $p < .05$.

Results

Sixty of the 120 Cred.MDT practitioners (50%) participated in this study. The other 60 practitioners did not participate in this study due to: 1) no reason ($n = 9$, 8%), 2) no response to the survey ($n = 28$, 23%), where seven persons were not contactable via their emails, 3) lack of time ($n = 17$, 14%), and 4) too much difficulty to understand or identify MDT subgroups ($n = 6$, 5%), where two persons also had difficulty understanding the English assessment.

Table 2 details demographic information and attitude toward MDT for extremity problems in the 60 participants. The proportion who rated 'almost never' or 'some of the time' for the frequency of using MDT for extremity problems was 63%. The proportion who perceived their confidence to utilize MDT for extremity

Table 2 Demographic Information and Attitude Towards Mechanical Diagnosis and Therapy (MDT) for Extremity Problems in 60 Participants

Age		38.6 ± 6.3
Years since qualifying as a practitioner		12.3 ± 5.7
Years since passing the Credentialing Examination of MDT		3.1 ± 2.1
Gender		
Male		49 (82)
Female		11 (18)
Discipline		
Orthopaedic surgeon		3 (5)
Physiotherapist		48 (80)
Occupational therapist		1 (2)
Judo-therapist		8 (13)
Proportions of workload for patients with extremity problems		
<25%		31 (52)
25%-50%		21 (35)
50%-75%		7 (12)
>75%		1 (2)
Frequency of using MDT for extremity problems		
Almost never		12 (20)
Some of the time		26 (43)
Most of the time		14 (23)
All the time		8 (13)
Confidence to utilize MDT for extremity problems		
Not confident at all		9 (15)
Relatively not confident		38 (63)
Relatively confident		13 (22)
Very confident		0 (0)
A body part where participants can derive therapeutic effects using MDT with the most confidence		
Shoulder		9 (15)
Upper extremity problems	Elbow	4 (7)
	Wrist	1 (2)
	Finger	0 (0)
	Hip	9 (15)
Lower extremity problems	Knee	32 (53)
	Foot	5 (8)
A body part where participants can derive therapeutic effects using MDT with the least confidence		
Shoulder		31 (52)
Upper extremity problems	Elbow	3 (5)
	Wrist	5 (8)
	Finger	7 (12)
	Hip	7 (12)
Lower extremity problems	Knee	3 (5)
	Foot	4 (7)

Values are expressed with mean ± SD or Number (%).

problems as 'not confident at all' or 'relatively not confident' was 78%. The majority (53%) felt the most confidence to derive positive therapeutic effects using MDT for problems around the knee. The majority (52%) felt the least confidence to derive positive therapeutic effects using MDT for symptoms around the shoulder. Generally, 76% of the 60 participants felt the least confidence to derive positive therapeutic effects using

MDT for upper extremity problems and 77% felt the most confidence to derive positive therapeutic effects using MDT for lower extremity problems.

Table 3 presents the responses to the 25 extremity vignettes and accuracy of the classification. The overall accuracy was 87%. The mean accuracy for the 12 vignettes with upper limb problems and for the 13 vignettes with lower limb problems was 91% and 84%, respectively. The mean accuracy of the different subgroups was 93% (Derangement), 93% (Articular Dysfunction) and 77% (Contractile Dysfunction). Fleiss's κ (95% confidence interval) over the 25 vignettes was 0.78 (0.70-0.88), indicating good inter-examiner agreement for the MDT classification. Similarly, the κ value for the 12 vignettes with upper limb complaints was 0.83 (0.78-0.89), indicating very good inter-examiner agreement. The κ value for the 13 vignettes with lower limb problems was 0.73 (0.67-0.79), indicating good inter-examiner agreement.

As there was a discrepancy between good accuracy of the classification and limited confidence of using MDT for extremity problems, a post-hoc analysis using Spearman's rank correlation coefficient was conducted to explore factors associated with overall accuracy and confidence to apply MDT for extremity problems (Table 4). Potential factors included: (1) age, (2) years since qualifying as a practitioner, (3) years since passing the credentialing examination of MDT, (4) gender, (5) proportions of workload for patients with extremity problems, and frequency of using MDT for extremity problems. Consequently, there was no correlation between overall accuracy and other variables (all $P < .05$). A moderate¹⁰ positive correlation ($P < .001$) was detected between the confidence to utilize MDT for extremity problems and frequency of using MDT for extremity problems.

Discussion

MDT classification was completed by 60 of 120 Cred.MDT practitioners in Japan. The participation ratio seemed acceptable as the response ratio in internet survey is expected to be about 20% - 50%.¹¹⁻¹³ This study found that the majority of the Cred.MDT practitioners in Japan did not use MDT most of the time for the management of patients with extremity problems and were not confident to apply MDT to patients with extremity problems. However, the overall accuracy of their MDT classification for extremity problems was high and the inter-examiner agreement of the classification seemed acceptable, which are similar

Table 3 Responses of the 60 Practitioners to 25 Extremity Patient Vignettes and Accuracy of the Classification

Vignette	Derangement (n)	AD (n)	CD (n)	Posture (n)	Spinal (n)	Other (n)	Accuracy (%)
1	3	0	0	0	56 ^a	1	93
2	2	4	53 ^a	0	0	1	88
3	60 ^a	0	0	0	0	0	100
4	59 ^a	0	0	0	0	1	98
5	7	5	45 ^a	1	0	2	75
6	59 ^a	0	1	0	0	0	98
7	1	0	0	2	57 ^a	0	95
8	0	56 ^a	2	0	0	2	93
9	5	15	33 ^a	0	0	7	55
10	9	4	1	0	0	46 ^a	77
11	5	4	45 ^a	0	2	4	75
12	43 ^a	6	7	0	2	2	72
13	5	1	6	0	0	48 ^a	80
14	45 ^a	6	8	0	0	1	75
15	60 ^a	0	0	0	0	0	100
16	60 ^a	0	0	0	0	0	100
17	3	5	43 ^a	0	1	8	72
18	2	3	51 ^a	0	0	4	85
19	0	54 ^a	5	0	1	0	90
20	4	2	0	0	53 ^a	1	88
21	2	1	52 ^a	1	0	4	87
22	1	56 ^a	2	0	1	0	93
23	1	57 ^a	1	0	1	0	95
24	59 ^a	0	1	0	0	0	98
25	1	55 ^a	3	0	0	1	92

AD, articular dysfunction; CD, contractile dysfunction.

^a Indicates a correct subgroup chosen by the majority of therapists with diploma degree of Mechanical Diagnosis and Therapy.⁸

to that of Dip.MDT practitioners in the previous study.⁸ The MDT educational program is standardized. Thus, it is assumed that knowledge about MDT of all participants in Japan is comparable to that of Cred.MDT practitioners around the world and it can be generalized that Cred.MDT practitioners have acceptable accuracy and reliability of MDT classification for extremity complaints from information on the assessment form.

The majority of the Cred.MDT practitioners (78%) reported lack of confidence in using MDT for extremity problems. The proportion increases to 80% when the six practitioners who told us their reasons for not participating in the study as 'too much difficulty to understand or identify MDT subgroups' were considered as those with the lack of confidence. This finding may enable us to consider two potential reasons. One possible reason is associated with clinical experience and MDT experience. The Cred.MDT practitioners in this study had less clinical experience and MDT experience than Dip.MDT practitioners in the previous survey⁸ (mean, 17.4 years of clinical experience and 8.2 years since gaining Dip.MDT). This speculation can be supported by the finding in the post-hoc

analysis, where there was a moderate correlation between the confidence to apply MDT to patients with extremity problems and frequency of using MDT for extremity problems (Table 4). Another potential reason is the lack of clinical training by treating patients in Cred.MDT practitioners (Table 2). Classroom instruction only may not change clinician's behavior and confidence to apply their patients with a treatment newly learned in a workshop. Future research looking at barriers and strategies for changing behavior of clinicians would be required to facilitate translation of evidence into practice not only for MDT but also other therapeutic approaches.

The body parts where the majority of Cred.MDT participants can derive therapeutic effects using MDT with the most and the least confidence were the knee and the shoulder, respectively. These findings may reflect the prevalence of extremity problems and the degree of joint freedom. The knee and shoulder are common sites of symptoms in those visiting primary care.^{14,15} The knee movement is relatively simple as the primary movement is flexion-extension while the shoulder movement is complex. The greater variety of planes of movement in the shoulder may cause

Table 4 Spearman's ρ Correlations of Overall Accuracy of Mechanical Diagnosis and Therapy (MDT) Classification and Confidence to Utilize MDT for Extremity Problems to Age, Years Since Qualifying as a Practitioner, Years Since Passing the Credentialing Examination of MDT, Gender, Proportions of Workload for Patients With Extremity Problems, and Frequency of Using MDT for Extremity Problems

	2	3	4	5	6	7	8
1. Overall accuracy	.04	-.20	.06	.00	.02	.16	.00
2. Confidence		-.27 ^a	-.09	-.08	-.20	-.17	.71 ^b
3. Age			.55 ^b	-.02	-.21	-.27 ^a	-.09
4. Years of practitioner				.32 ^a	.05	-.08	.12
5. Years of Cred.MDT					.20	-.06	-.08
6. Gender						.14	.08
7. Proportion of extremity workload							-.18
8. Frequency of using MDT							

Confidence, confidence to utilize MDT for extremity problems (1: not confident, 2: relatively not confident, 3: relatively confident, 4: very confident); Years of practitioner, years since qualifying as a practitioner; Years of Cred.MDT, years since passing the credentialing examination of MDT; Proportions of extremity workload, proportion of workload for patients with extremity problems (1: < 25%, 2: 25%-50%, 3: 50%-75%, 4: > 75%); Frequency of using MDT, frequency of using MDT for extremity problems (0: almost never, 1: some of the time, 2: most of the time, 3: all the time).

^a < .05.

^b < .001.

increased complexity in the history and examination, which challenge clinician's decision making for MDT classification. Interestingly, the majority of the Cred. MDT practitioners felt the least confidence to derive therapeutic effects using MDT for upper extremity problems and the most confidence for lower extremity problems. However, accuracy for the 12 vignettes with upper extremity problems was similar to that for the 13 vignettes with lower extremity problems. This indicates that reasons for their lack of confidence to derive therapeutic effects using MDT for upper extremity problems may be associated with other factors rather than the classification skill from data recorded in an assessment form, for instance, (1) skills to collect accurate data through physical assessments (e.g. performing resisted movement tests with appropriate force and assessing end-range movement with appropriate over pressure); (2) skills to select appropriate loading strategies for physical evaluations (e.g. weight bearing or non-weight bearing); and/or (3) skills to perform appropriate hands-on techniques (e.g. joint mobilization and manipulation).

Interestingly, the classification accuracy in the Contractile Dysfunction Syndrome (77%) appears to be lower compared to that in the Articular Dysfunction Syndrome (93%). In addition, agreement less than 80% happened in seven vignettes (Vignettes 5, 9, 10, 11, 12, 14, 17) and the same happened in the previous study⁸ recruiting Dip.MDT practitioners except Vignettes 10 and 11. Vignette 11 is an example of the Contractile

Dysfunction Syndrome. Characteristics of the Dysfunction Syndrome in the spine are similar to the characteristics of the Articular Dysfunction Syndrome not the Contractile Dysfunction Syndrome. Further, Vignette 10 is an example of trauma, a part of 'Other' subgroup, which seems more frequent in extremity disorders than spinal disorders. Thus, a reason for low classification accuracy in the Cred.MDT practitioners may be the unfamiliar characteristics of subgroups that are unique in extremity disorders.

Limitations

This study used vignettes to investigate general practitioners' classification skill for extremity problems into MDT subgroups from information on the MDT assessment form. The accuracy for their classification seems acceptable. However, the finding does not guarantee that general MDT practitioners can accurately identify an appropriate subgroup of patients by themselves. This would require further research by allowing Cred.MDT practitioners to perform physical assessments with actual patients and identify an appropriate subgroup individually, similarly to a previous study.¹⁶

The majority of the Cred.MDT practitioners in Japan were not confident to apply MDT to patients with extremity problems. A post-hoc analysis suggested that increasing frequency of using MDT for extremities is important to raise their confidence level. However, there is still uncertainty of reasons for the lack of

confidence to apply MDT for extremity disorders because this study did not collect the reasons from each participant. Further studies must investigate the gap between the lack of confidence to apply MDT for extremity patients and acceptable reliability of MDT classification for extremity problems from information on the MDT assessment sheet.

The participation ratio of 50% seemed acceptable as an internet survey but two limitations could be included. First, participation was voluntary and there is a possibility of self-selection bias due to the lack of confidence of the use of MDT. An attempt was made to reduce the self-selection bias using an anonymous survey. Second, although this study conducted a national survey, this cohort (approximately 120 Cred.MDT practitioners in Japan) is limited to a small part of a whole population (approximately 4600 Cred.MDT practitioners around the world). However, the MDT educational program is standardized and therefore the finding about reliability in this study can be generalized.

Some Cred.MDT practitioners who were eligible to this study might also not participate in the study due to difficulty understanding English assessment forms. However, English used on the form was relatively plain and only two persons (1.7%) reported such difficulty. Therefore, the negative impact of the English assessment form on the finding of this study was negligible.

Further studies must investigate the gap between the lack of confidence to apply MDT for extremity patients and acceptable reliability of MDT classification for extremity problems from information on the MDT assessment sheet.

Conclusion

The majority of the Cred.MDT practitioners in Japan do not use MDT most of the time for the management of patients with extremity problems and are not confident to apply MDT to these patients. However, Cred.MDT practitioners in Japan have good reliability of MDT classification for extremity problems from information on the MDT assessment sheet.

Funding Sources and Conflicts of Interest

No funding was reported for this study. One of the authors (YI) is an instructor of the International McKenzie Institute. He provides educational workshops about MDT for which he receives a teaching fee. The other authors (HT and SM) have no conflicts of interest.

Appendix. Supplementary data

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.jcm.2014.12.002>.

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