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The Recognition of Locomotive Syndrome in 2014: A Cross-Sectional Study in the Orthopeadic Outpatients in Tokyo

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Authors' contributions

This work was carried out in collaboration between all authors. Authors MI and YK designed the study, wrote the protocol, and wrote the first draft of the manuscript. Author YS designed the study, managed the study and literature searches, wrote the first draft of the manuscript. Authors TK and JM analyses of the study performed the spectroscopy analysis and authors MI, YK, KA, KM, DK and TO collected the data. Authors TT, TS and KK supervised the study and the data. All authors read and approved the final manuscript.

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ABSTRACT

Background: To prevent locomotor dysfunction, the Japanese Orthopaedic Association (JOA) proposed the concept of locomotive syndrome (LS) in 2007, and has carried out numerous campaigns to increase the awareness of LS. We previously surveyed the recognition of LS and reported that 24.6% of outpatients knew about it in 2013. Were surveyed the recognition of LS and

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the prevalence of LS in 2014 to elucidate the effects and trends of the recognition of LS and the promotion campaigns.
Methods: To investigate the recognition of LS and the prevalence of LS, we conducted a questionnaire survey including both the 25-question Geriatric Locomotive Function Scale (GLFS-25) and the "loco-check" in 1,027 (450 male and 577 female) orthopaedic outpatients. This survey was performed at Juntendo University Hospital (Tokyo, Japan), from March to June 2014.
Results: The concept about LS was known to 26.4% of the patients, which was increased 1.8% in comparison to our survey in 2013. And, the most common media source to obtain information about LS was TV. Newspapers and magazines were also common media sources. In terms of the prevalence of LS in orthopaedic outpatients, 60.5% (734 of 1,027 people who answered the questions) were classified into the LS high-risk group as determined using the GLFS-25. The prevalence of LS was 54.9% in males and 64.3% in females.
Conclusion: We investigated the recognition of LS and the prevalence of LS using an outpatient cohort from the Tokyo area. This study demonstrated that the recognition of LS in 2014 was 26.4%, which increased by 1.8% compared to our survey in 2013. Our outpatient-based survey is therefore considered to positively help obtain a better understanding of the effects and trends of promoting the concept of LS.

Keywords: Locomotive syndrome; orthopaedics; GLFS-25; loco-check; recognition.

1. INTRODUCTION

In order to prevent a condition in high-risk groups of patients with musculoskeletal diseases who are highly likely to require nursing care, the Japanese Orthopaedic Association (JOA) have advocated the 'locomotive syndrome' since 2007 [1-3]. Weakening of the musculoskeletal organs (bones, joins and muscles) cause Locomotive syndrome (LS) [1-3], and the functional disabilities in these organs also lead to be unable to transport by themselves [1-3]. Accordingly, once people who would be in the risk conditions or had some problems of the locomotive organ, it would be require to take care themselves to prevent falling into these disabling conditions as well as leading to need outside cares and supports [1-3].

On the other hand, this concept of LS has not been known well and almost people would not understand LS accurately. In "Kenkou-nihon 21" which is government-led policy, the promotion of the recognition of LS has been conducted since 2012 and the aim to accomplish an 80% recognition until 2020 [4-5]. The Japanese Locomo Challenge Promotion Conference (JLCPC) started conducting surveys to evaluate the recognition of LS using a web-based questionnaire, and the recognition rate in 2013 showed 26.6%. However, a survey of the recognition of LS in an outpatient (hospital-based) cohort had not been performed. Therefore, since 2013, we have investigated the recognition rate of LS using an outpatient cohort consisting of approximately 1,000 new orthopaedic patients treated at Juntendo University Hospital, Tokyo, Japan. In 2013, we reported that a total of the 24.6% of patients have known about LS, and this result was similar to the JLCPC studies [6].

The purpose of this study is to ascertain that how number of the recognition rate of LS has increased this year (2014) as compare with last year (2013) and to take the states of the LS into considerations. Therefore, we carried out the investigation that targeted at approximately 1,000 new orthopaedic patients in our hospital. Additionally, we surveyed what media sources are influential to spread the information about LS, and the prevalence rate of LS using the GLFS-25 and loco-check. Our surveys may be conducive to understand whether the promotion campaigns are doing well and to assess the association between the concepts of LS and clinical conditions.

2. MATERIALS AND METHODS

2.1 Outpatient Cohort

To research the recognition of LS and the prevalence of LS, we conducted a questionnaire survey, including the "GLFS-25" and the "loco-check," inorthopaedic outpatients treated at Juntendo University Hospital (Tokyo, Japan)from March to June 2014 (cross-sectional study). We focused on new patients who came to our department for the first time or who had new diseases, even if they had visited our department in the past. We collected the data for a total of

1,027 orthopedic patients (450 males and 577 females; age, 5-94 years; mean age, 52.3 years). For those that did not complete the entire questionnaire, partial answers were used. This project was approved by the institutional review board of Juntendo University.

2.2 The Questionnaire Survey of the Recognition of LS

With respect to the recognition of LS, we asked the 7 questions (Table 1).

2.3 The25-question Geriatric Locomotive Function Scale (GLFS-25) and the "Loco-check" Questionnaire [5]

Using a self-completed questionnaire called the 25-question Geriatric Locomotive Function Scale (GLFS-25) and loco-check, which is included in the LS brochure, performs the diagnosis of LS and the tendency of LS.

The GLFS-25 questionnaire consists of 25 statements (Table 2) for the last one-month: (as described in a previous report) [5].The GLFS-25 is a self-administered, and it is relatively comprehensive measure consisting of 25 items those are graded with 5-point scales, from no impairment (0 points) to severe impairment (4 points) [4-5,8-12]. Then the scores are added together to produce a total score 0-100 with a higher number indicating a greater severe condition of LS [4-5,8-12]. JLCPC divided these results to three groups using GLFS-25 and published a person who the GLFS-25 score is higher than the mean-aged points (High risk group) is diagnosed to have possibilities to be in the LS [4-5,8-12]. Therefore, in this survey, we diagnosed LS using the GLFS-25 score which is higher than the mean-aged points (High risk group).

The loco-check questionnaire consists of seven statements (Table 3): (as described in a previous report) [1-3,6-8]. In this survey, participants who checked yes to one or more statements were defined as a tendency of having LS.

3. RESULTS

A total of 263 of 995 (26.4%) patients knew about the concept of LS (995 of the 1,027 people answered this question) (Fig. 1).We found that LS was recognized by 19.3% of males and 31.9% of females (Fig. 1). In the age-specific analyses of the recognition of LS, the older people had a tendency to have a higher recognition in comparison to younger people (Fig. 1). Compared to the results from the survey in 2013, our cohort demonstrated a 24.6% recognition rate, which was an increase of 1.8%over the 2013 results (Fig. 1) [6].

When we asked about how ways they had received the information about LS, 417 answers were collected from 263 patients. 178 (42.7%) of the 417 answers indicated that the most common media source to obtain information about LS was TV (Fig. 2). Ninety-five (22.8%) of the 417 answers were that the patient had received information about LS from newspapers and 47 (11.3%) of 417responded that they had learned about LS from magazines (Fig. 2). In our survey, TV was the most typical way to obtain the information about LS for patients in all ages. We compared the data from 2013 to the results of this study (2014) and we found that there were similarities in the both trends [6].

Table 1. The questionnaire survey of the recognition of LS

(1) Have you ever heard of LS?
(2) From which media sources did you learn about LS?
(3) Have you seen the brochure about LS?
(4) Where did you see the brochure about LS?
(5) Where should the brochure about LS be available?
(6) Could you understand the concept of LS based on the brochure?
(7) Were you motivated to perform daily exercise by the brochure about LS?
Closed questions: (1), (3), (6) and (7). Multi-choice questions: (2), (4) and (5) are allowed to select the multi-choice.
(6) and (7) were scored from 1 to 4 (1; poor or low, 2; slightly poor or slightly low, 3; good or high, 4; very good or very high).

Table 2. The 25-question geriatric locomotive function scale

	0 point	1 point	2 point	3 point	4 point
(1) Did you have any pain (including numbness) in your neck or upper limbs (shoulder, arm, or hand)?	No pain	Mild pain	Moderate pain	Considerable pain	Severe pain
(2) Did you have any pain in your back, lower back or buttocks?	No pain	Mild pain	Moderate pain	Considerable pain	Severe pain
(3) Did you have any pain (including numbness) in your lower limbs (hip, thigh, knee, calf, ankle, or foot)?	No pain	Mild pain	Moderate pain	Considerable pain	Severe pain
(4) To what extent has it been painful to move your body in daily life?	No pain	Mild pain	Moderate pain	Considerable pain	Severe pain
(5) To extent has it been difficult to get up from a bed or lie down?	Not difficult	Mildly difficult	Moderately difficult	Considerably difficult	Extremely difficult
(6) To what extent has it been difficult to stand up from a chair?	Not difficult	Mildly difficult	Moderately difficult	Considerably difficult	Extremely difficult
(7) To what extent has it been difficult to walk inside the house?	Not difficult	Mildly difficult	Moderately difficult	Considerably difficult	Extremely difficult
(8) To what extent has it been difficult to put on and take off shirts?	Not difficult	Mildly difficult	Moderately difficult	Considerably difficult	Extremely difficult
(9) To extent has it been difficult to put on and take off trousers and pants?	Not difficult	Mildly difficult	Moderately difficult	Considerably difficult	Extremely difficult
(10) To extent has it been difficult to use the toilet?	Not difficult	Mildly difficult	Moderately difficult	Considerably difficult	Extremely difficult
(11) To extent has it been difficult to wash your body in the bath?	Not difficult	Mildly difficult	Moderately difficult	Considerably difficult	Extremely difficult
(12) To extent has it been difficult to go up and down stairs?	Not difficult	Mildly difficult	Moderately difficult	Considerably difficult	Extremely difficult
(13) To extent has it been difficult to walk briskly?	Not difficult	Mildly difficult	Moderately difficult	Considerably difficult	Extremely difficult
(14) To extent has it been difficult to keep yourself neat?	Not difficult	Mildly difficult	Moderately difficult	Considerably difficult	Extremely difficult

Table 2 continued ……

(15) How far can you keep walking without rest?	More than 2-3 km	approximately 1 km	approximately 300m	approximately 100m	approximately 10m
(16) To extent has it been difficult to go out to visit neighbors?	Not difficult	Mildly difficult	Moderately difficult	Considerably difficult	Extremely difficult
(17) To extent has it been difficult to carry objects weighing approximately 2 kilograms (2 standard milk bottles or 2 PET bottle each containing 1-liter)?	Not difficult	Mildly difficult	Moderately difficult	Considerably difficult	Extremely difficult
(18) To extent has it been difficult to go out using public transportation?	Not difficult	Mildly difficult	Moderately difficult	Considerably difficult	Extremely difficult
(19) To extent have simple tasks and housework (preparing meals, cleaning up, etc.) been difficult?	Not difficult	Mildly difficult	Moderately difficult	Considerably difficult	Extremely difficult
(20) To what extent have load-bearing tasks and housework (cleaning the yard, carrying heavy bedding, etc.) been difficult?	Not difficult	Mildly difficult	Moderately difficult	Considerably difficult	Extremely difficult
(21) To extent has it been difficult to perform sports activity (jogging, swimming gate ball, dancing, etc.)?	Not difficult	Mildly difficult	Moderately difficult	Considerably difficult	Extremely difficult
(22) Have you been restricted from meeting your friends?	Not restricted	Slightly restricted	Restricted about half the time	Considerably restricted	Gave up all activities
(23) Have you been restricted from joining social activities (meeting friends, play sport, engaging in activities and hobbies, etc.)?	Not restricted	Slightly restricted	Restricted about half the time	Considerably restricted	Gave up all activities
(24) Have you ever felt anxious about falls in your house?	Have not felt anxious	Have occasionally felt anxious	Have sometimes felt anxious	Have often felt anxious	Have constantly felt anxious
(25) Have you ever felt anxious about being unable to walk in the future?	Have not felt anxious	Have occasionally felt anxious	Have sometimes felt anxious	Have often felt anxious	Have constantly felt anxious

Table 3. Loco-check

(1) You cannot put on a pair of socks while standing on one leg.
(2) You stumble or slip in your house.
(3) You need to use a handrail when going up stairs.
(4) You cannot get across the road at a crossing before the traffic light changes.
(5)You have difficulty walking continuously for 15 min.
(6) You find it difficult to walk home carrying a shopping bag weighing about 2 kg.
(7) You find it difficult to do housework requiring physical strength.
All questions are closed questions.

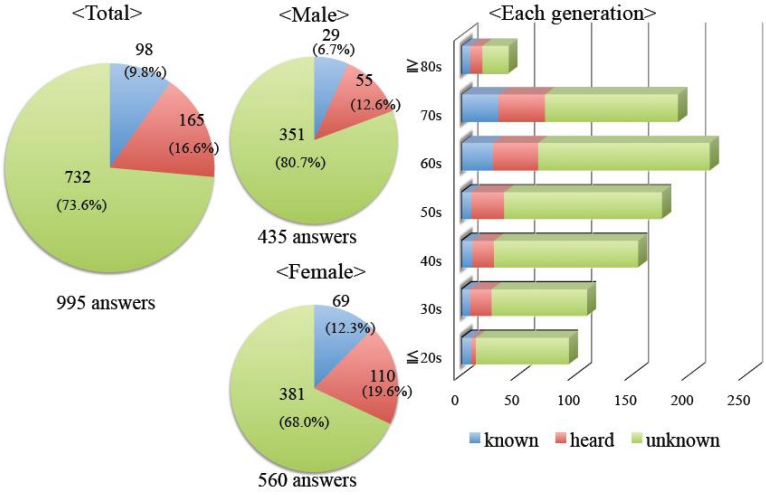

Fig. 1. The recognition of LS. A total of 995 of the 1,027 patients answered this question, and 26.4% of these subjects recognized the concept of LS. The recognition of LS was higher in females (31.9%) than in males (19.3%). The older people had a tendency to have higher recognition than the younger people

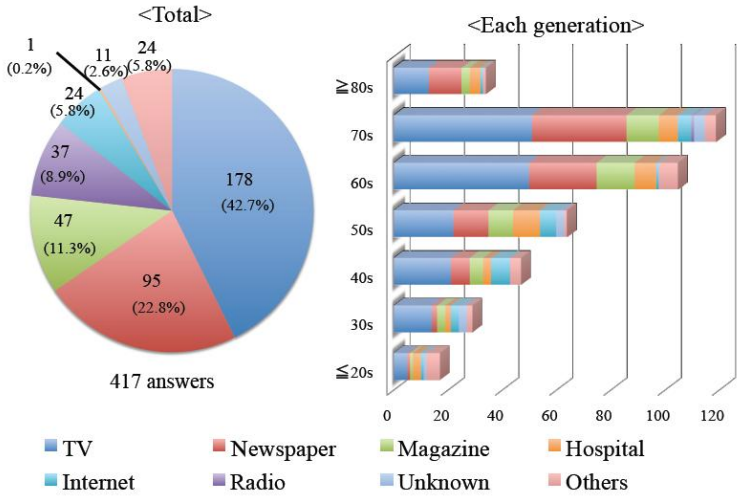

Fig. 2. The media sources from which the information about LS was obtained (multiple answers possible).A total of 263 patients provided 417 answers to this question. We surveyed which media source provided the information about LS to the people who knew about the concept of LS. TV was the most frequently reported source for all age groups

62 (8.1%) of the 766 patients have taken the brochure, and 49 (79.0%) patients who had taken the brochures had taken them in the hospital (Figs. 3A and 3B). The percentage of patients who had taken the brochure had increased compared to the previous year (4.9% in 2013) [6]. We asked where the brochure should be available to take them conveniently. 1022 answers were acquired and 437 patients answered that they wish the brochure would be in hospital, 235 in shops and 163 in the city hall (Fig. 3C). These results were similar findings to those of last year (in 2013 survey) [6].

With respect to the patients' level of understanding of the concept of LS based on the brochure (763 of 1,027 patients answered this question), 696 (91.2%) of the 763 patients could understand the concept of LS based on the brochure (Fig. 4). There were no differences in the rates between the 2013 and 2014 surveys [6]. We also asked whether the brochure encouraged people to engage in exercise, and found that 721(92.1%) of the 783 people who answered the questions indicated that they were motivated by the brochure (Fig. 5). There were no differences in this rate between the 2013 and 2014 surveys [6].

We performed the survey using both the GLFS-25 and loco-check. Based on the GLFS-25, a total of 444 (60.5%) of the 734 patients were considered to be in the state of LS (high-risk). Patients who have LS using GLFS-25 consisted of 281 female and 163 male. Regarding to the loco-check, the total prevalence rate of LS was 48.2%. Patients who have LS using loco-check consisted of 203 female and 127 male. The prevalence rate of LS in the female was significantly higher than that in the male in both examinations. Additionally, in the age-specific analyses in the both examinations, the prevalence of LS had tendency to increase with age in both male and female (Fig. 6).

In 2013, we performed the survey using only the loco-check, which consisted of seven questions (an easier format compared to the GLFS-25). All 1,010 (100%) patients answered our questions using the loco-check in that survey. In the 2014 survey, we additionally included the GLFS-25, which consisted of 25 questions, and received answers from 734 (71.5%) of the 1,027 patients.

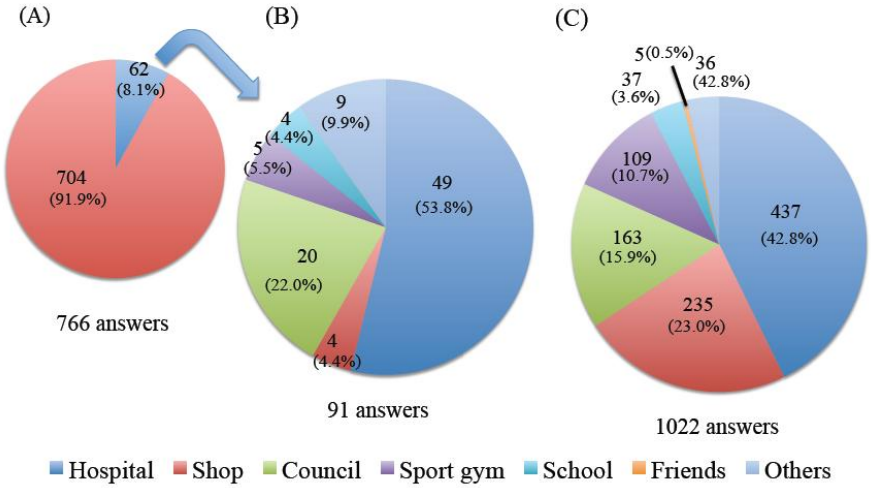

Fig. 3. The brochure about LS. (A) We surveyed patients about the recognition rate of the brochure about LS, and (B) where the subjects had seen the brochure (multiple answers possible). (A) A total of 766 of the 1,027 people answered this question. Sixty-two (8.1%) people had seen the brochure. (B) Most of these 62 subjects saw the brochure at the hospital. (C) The place where subjects recommended that the brochure should be available (multiple answers possible). 251 patients provided 1,022 answers to this question. The survey indicated that people would want to obtain the brochure at the hospital, at shops or in the city hall

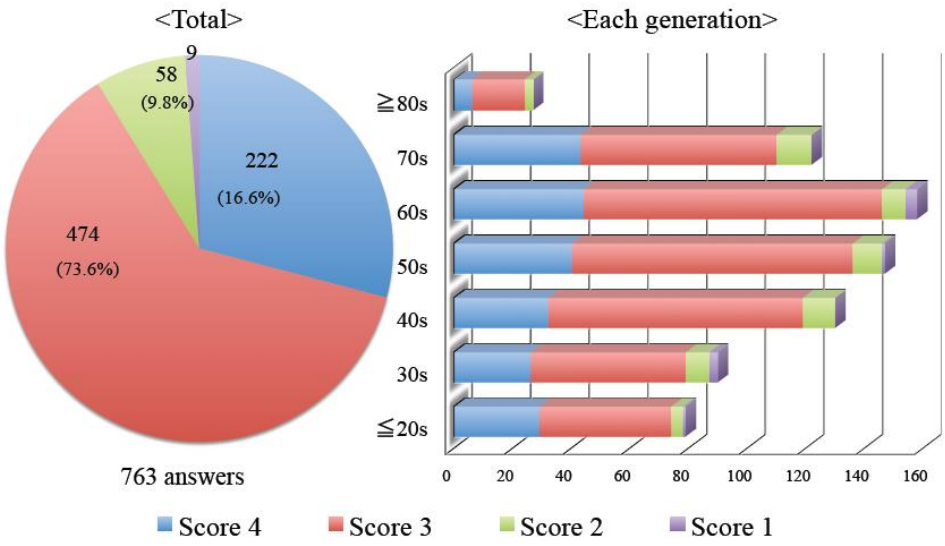

Fig. 4. The level of understanding of LS based on the brochure. We collected the information (the 763 answers of the 1,027 patients) regarding the understanding level of LS in our study and we found that he majority (91.2%) of the patients could understand the concept of LS

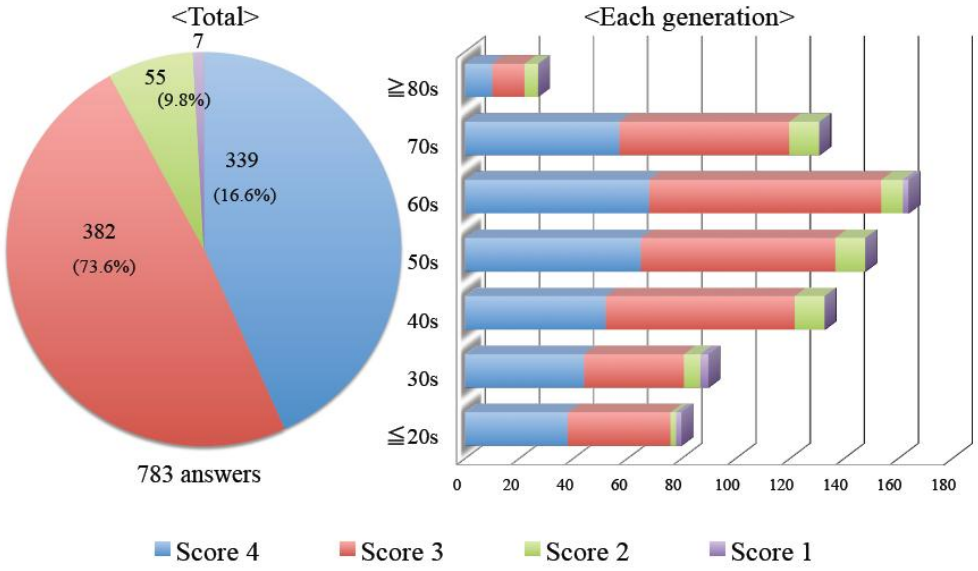

Fig. 5. The motivation of people to perform daily exercise based on the brochure. A total of 783 of the 1,027 patients answered this question. The majority (92.1%) of people were motivated to exercise by the brochure about LS

4. DISCUSSION

The JLCPC conducted an internet-based survey of the recognition of LS, and the survey demonstrated that the recognition rate in March 2014 had reached 36.1% [4]. In comparison to their 2012 and 2013 surveys (the recognition rates were 17.3% in 2012 and 26.6% in 2013), the rate of recognition of LS has been dramatically increasing. We suppose that the reasons for this are that LS has been featured many times as a part of health programs or as a current issue on TV, local government public relations news programs, newspapers, weekly journals and internet-based news.

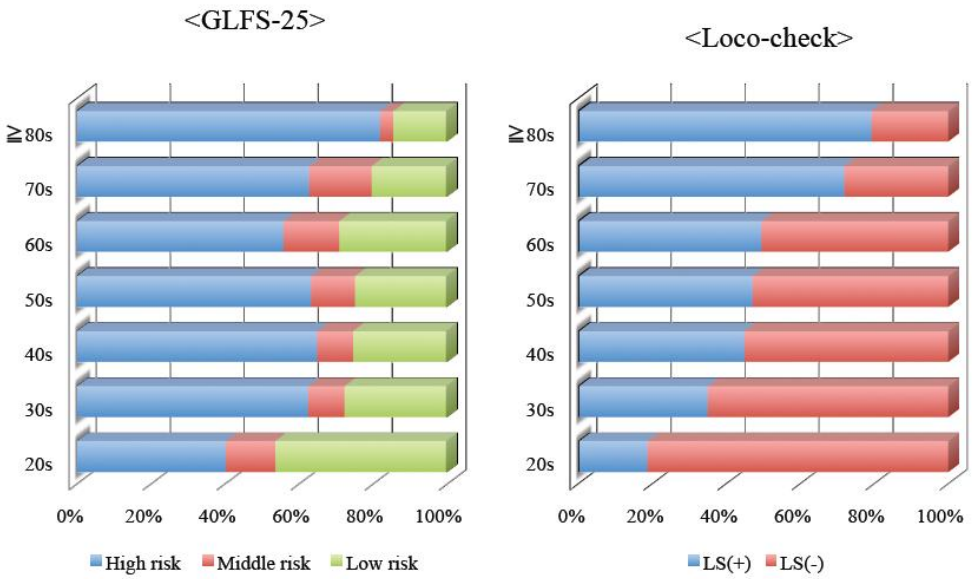

Fig. 6. We performed the survey using both the GLFS-25 and loco-check. Based on the GLFS-25, a total of 444 (60.5%) of the 734 patients who answered the questions were considered to have LS. Based on the loco-check, the total prevalence rate of LS was 48.2%

However, we conducted our hospital-based survey (using approximately 1,000 orthopedic outpatients) from March to June in 2014 to investigate the recognition of LS in 2014 in the clinical setting, and our study indicated that the recognition rate of LS was 26.4%. In 2013, we also performed a similar survey (also including approximately 1,000 orthopedic outpatients) at the same institution, from March to June in 2013, and that study found that 24.6% of the subjects knew about LS [6]. This was similar to the results of the JLCPC's 2013 internet-based survey (26.6%) in March 2013 [6]. We considered that our cohort reflected the accuracy of their internet-based study. However, based on the results of our 2014 survey, there were big differences in the recognition of LS between their cohort and our patients.

Therefore, we assessed the possible reasons for the discrepancies in the recognition of LS between our survey and that by the JLCPC. First, we think that the different populations that were assessed may have been responsible for the discrepancies. We supposed that people who took part in the JLCPC's Internet survey may have tended to use the Internet frequently, and considered that frequent Internet users may have a tendency to be exposed to more diverse information and to be exposed to more information in general in comparison to infrequent Internet users. With respect to our outpatient survey, which consisted of patients who had orthopedic symptoms and/or orthopedic diseases, before we started our survey in 2013, we estimate that many orthopaedic outpatients have known about LS. However we found that the orthopedic patients (our survey) didn't have any differences of recognition rates, in comparing to people who did not have orthopaedic symptoms (JLCPC's survey).

Second, there may have been regional differences in the recognition of LS between the Tokyo area and other areas. The JLCPC's survey also analyzed the recognition of LS by region, and these results indicated that the Tokyo area (32.9%), including Tokyo prefecture, Kanagawa prefecture, Saitama prefecture and Chiba prefecture, had a lower recognition of LS than the other areas [13-14]. We therefore think that the regional differences may have also contributed to the discrepancies.

Third, we assessed the differences in the age distributions in each cohort. The JLCPC's survey did not describe the details of the age of their population, but the survey did describe the age-specific recognition rates of LS, especially over 50 years. Therefore, we compared the age-specific recognition rate between JLCPC's survey and our survey. For patients over 50

years old, the recognition of LS was 44.6% in the JLCPC's survey and 31.3% in our survey. There results demonstrated no concerns to exist in regard to the age distribution.

When we asked about which media sources gave the information of LS, we found that most frequent media sources for taking the information of LS were TV. This result was also the same result as in 2013 [6]. The JOA and JLCPC have already been trying to use mass media to promote the enlightenment of the population about LS [13]. These data suggest that we should focus on using TV to promote the recognition of LS more efficiently.

With respect to the LS brochure, we surveyed where the subjects thought the brochure should be available. The survey revealed that the hospital is the preferred place to obtain the LS brochure, and was also the place where subjects recommended that the brochure should be available. These results were in agreement with those from 2013 [6]. We suggest that the LS brochure should be placed in various departments throughout the hospital, especially in the department of Internal Medicine, because our survey also indicated that 76.7% of the people in our survey had non-orthopedic diseases.

In 2013, we performed the survey using only loco-check, which consisted of only seven questions, and we successfully received answers from all 1,010 patients [6]. However, in the 2014 surveys, we additionally included the GLFS-25, which consisted of 25 questions, and we received answers from only 734 (71.5%) of the 1,027 patients. These results indicated that the GLFS-25 might have been perceived as too long or confusing in comparison to the loco-check. Therefore, the JLCPC should develop easy formats for detecting the LS by modifying the GLFS-25, especially for older populations.

5. CONCLUSION

We investigated the recognition of LS and the prevalence of LS using an outpatient cohort from the Tokyo area. This study demonstrated that the rate of recognition of LS in 2014 was 26.4%, which had increased 1.8% compared to our survey in 2013. Our outpatient-based survey may therefore help to elucidate the effects and trends of promoting LS. We believe the promotion of the awareness of LS contribute to prevent the LS and locomotor disabilities.

CONSENT

All authors declare that written informed consent was obtained from the patients for publication of this study and the institutional review board of Juntendo University approved this project.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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