

The approach of physiatrists to low back pain across Europe

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Abstract.

BACKGROUND: Low back pain (LBP) is the most common type of musculoskeletal pain, thus it is one of the most commonly encountered conditions in Physical and Rehabilitation Medicine. The physicians who are primarily responsible for the nonsurgical management of LBP are physiatrists.

OBJECTIVE: The present study aimed to investigate the approaches of physiatrists to low back pain across Europe. Preferences, tendencies, and priorities in the diagnosis, management, and treatment of LBP, as well as the epidemiological data pertaining to LBP in PRM practice were evaluated in this Europe-wide study.

METHODS: The study was conducted under the control of the European Society of Physical and Rehabilitation Medicine (ES-PRM) Musculoskeletal Disorders Research Committee. A total of 576 physiatrists from most European countries participated in the survey.

RESULTS: The results show that physiatrists frequently deal with patients with LBP in their daily practice. Most patients are not referred to other departments and are treated with various conservative methods. Less than one-fifth of patients are primarily referred for surgery. The physiatrists believe that a clear diagnosis to account for cases of low back pain is rarely established. The most common diagnosis is discopathy. History and physical examination remain the most valuable clinical evaluation tools for low back pain according to physiatrists. Less than half the patients require a magnetic resonance imaging. Non-steroidal anti-inflammatory drugs are the most commonly prescribed drugs for low back pain. Exercise, back care information, and physical therapy are the preferred conservative treatments. More than half of the physiatrists offer interventional treatments to patients with low back pain.

CONCLUSION: The present study is a preliminary report that presents the attitudes of European physiatrists in the management of low back pain. Further researches are warranted to standardize the conservative management of LBP.

Keywords: Low back pain, physiatrist, conservative management, rehabilitation

1. Introduction

Low back pain (LBP) is the most common type of musculoskeletal pain [1], thus it is one of the most commonly encountered conditions in Physical and Rehabilitation Medicine (PRM). Most people experience LBP at some point in life; the lifetime prevalence varies between 50% and 85% in epidemiological studies [2] and the annual prevalence is estimated at around 40% [3]. The Global Burden of Disease study reported that LBP is the highest ranked condition contributing to years lived with disability [4,5]. It is therefore a significant cause of disability and absence from work.

The physicians who are primarily responsible for the nonsurgical management of LBP are physiatrists. PRM is the specialism that deals with most stages in the management of LBP including the initial evaluation, differential diagnosis, planning appropriate nonsurgical treatments among the many options (patient

education, exercise, physical modalities, drugs, interventional pain procedures, etc.), follow-up, and referral for surgical treatment if necessary. The present study aimed to investigate the approaches of physiatrists to low back pain across Europe. Preferences, tendencies, and priorities in the diagnosis, management, and treatment of LBP, as well as the epidemiological data pertaining to LBP in PRM practice were evaluated in this Europe-wide study.

2. Methods

2.1. Study design and participants

A cross-sectional descriptive survey was undertaken to define the clinical approach of European physiatrists to LBP. A total of 576 physiatrists from most European countries participated in the survey. The survey was

carried out between October 2014 and October 2015. The study was conducted under the control of the European Society of Physical and Rehabilitation Medicine (ESPRM) Musculoskeletal Disorders Research Committee.

2.2. Procedures

An internet based-survey was prepared, and physiatrists from most European countries were invited to participate. National supervisors oversaw the distribution of the survey to physiatrists in their own country. Each national supervisor translated the survey to his or her own native language. The survey document was available to participants in both English and the native language. The survey was largely distributed via an online survey site (Survey Monkey®). Any participant who could not access the online survey site was asked to complete a digital survey document. The responses in the digital survey documents were collected by email. The national supervisors submitted manually the data in the digital survey documents to the online survey site instead of the participants who could not access the online survey site. All the responses were collected from the online survey site.

2.3. The survey

The survey included 22 multiple choices questions and took no more than 3 min to complete to ensure adherence. The questions were prepared by a group of senior physiatrists who each have at least 30 years of experience in PRM. The first part of the survey consisted of 6 questions related to the demographic characteristics of the participants including age, gender, job experience, academic degree, institution, and working area. The second part incorporated 15 questions relating to preferences for the assessment, management, and treatment of LBP. Participants were asked about the number of patients with LBP seen per week, the established causes of LBP, preferred diagnostic methods, the rates and reasons for referral to another clinical department, the preferred treatment options including pharmacological, patient education, physical modalities, exercise, interventional procedures, and the scales [6–10] on LBP which were used most frequently was questioned. The number of structured choices varied according to the nature of the question. Some of the questions were open-ended.

2.4. Statistical analysis

Data analysis was performed with SPSS for Win-

Table 1
Participants' demographics

	Participants (n = 576)
Sex	
Male	211 (36.6%)
Female	365 (63.4%)
Age	
20–30 years	59 (10.2%)
31–40 years	179 (31.2%)
41–50 years	169 (29.3%)
51–60 years	128 (22.2%)
> 60 years	41 (7.1%)
PRM experience	
≤ 5 years	123 (21.4%)
6–10 years	107 (18.5%)
10–20 years	185 (32.2%)
> 20 years	161 (27.9%)
Academic degree	
Resident/specialist registrar	91 (15.8%)
Specialist/consultant	364 (63.2%)
Assistant professor	28 (4.8%)
Associate professor	45 (7.8%)
Professor	48 (8.4%)
Institution	
Tertiary center (university or training hospital)	282 (48.9%)
Secondary center (state hospital)	175 (30.4%)
Primary care	33 (5.8%)
Private practice	86 (14.9%)
Population of the city worked in	
> 1000000	236 (40.9%)
> 500000–1000000	208 (36.1%)
Countryside (< 500000)	132 (23.0%)

PRM, physical and rehabilitation medicine.

SPSS, version 15.0 (SPSS Inc., Chicago, IL, USA). The data was treated in a descriptive and inferential manner. The categorical variables were presented as absolute values and percentages, and the numeric variables as means and standard deviations. The significance level was $p < 0.05$.

3. Results

3.1. Demographic data of the participants

A total of 576 physiatrists participated in the survey. Approximately 60% of the participants were over 40 years old and had specialist PRM experience of more than 10 years. Most of the participants were PRM specialists or consultants. One-fifth of the participants had a university academic degree. Half of the participants worked at a tertiary center. The demographic characteristics of the participants are given in Table 1.

3.2. Assessment and management of the LBP

Table 2 shows the rates of the responses to the

	Participants (n = 576)
Number of patients with LBP seen on average per week	
< 5 patients	56 (9.8%)
6–10 patients	107 (18.5%)
11–15 patients	111 (19.3%)
16–20 patients	85 (14.7%)
> 20 patients	216 (37.6%)
Percentage of patients with LBP given a clear diagnosis	
< 20%	56 (9.9%)
20–39%	90 (15.8%)
40–59%	167 (29.3%)
60–79%	175 (30.8%)
> 80%	81 (14.2%)
Most valuable diagnostic tools in clinical assessment of LBP	
History	494 (86.1%)
Physical examination	556 (96.8%)
Blood tests	46 (8.1%)
X-ray	226 (39.3%)
MRI	271 (47.2%)
Electrodiagnostic tests	65 (11.3%)
Most commonly used or familiarity with LBP scales	
Low Back Pain Rating Scale	91 (16.0%)
Oswestry Disability Index	206 (36.2%)
Progressive Isoinertial Lifting Evaluation	0 (0.0%)
Quebec Back Pain Disability Scale	27 (4.75%)
Rolland-Morris Disability questionnaire	57 (10.0%)
None	188 (33.0%)
Information relied on when treating a patient with LBP	
International evidence-based medicine guidelines	87 (15.8%)
Traditional clinical practice	51 (8.9%)
Both	435 (75.9%)
Percentage of referrals to another clinical department	
< 20%	454 (80.2%)
20–39%	83 (14.6%)
40–59%	19 (3.3%)
60–79%	8 (1.43%)
> 80%	2 (0.3%)
Percentage of patients with LBP treated as inpatients	
< 20%	409 (72.5%)
20–39%	71 (12.6%)
40–59%	41 (7.3%)
60–79%	20 (3.5%)
> 80%	23 (4.1%)
Percentage of referrals for surgical treatment	
< 20%	542 (95.2%)
20–39%	25 (4.4%)
40–59%	2 (0.3%)
60–79%	0 (0.0%)
> 80%	0 (0.0%)

LBP, low back pain; MRI, magnetic resonance imaging.

questions in this survey. Half of the physiatrists involved in the study reported they are responsible for the management of at least 15 patients with LBP per week. Less than 15% of physiatrists were able to establish a clear diagnosis and cause of LBP for at least 80% of their patients. The most common pathologies in patients with LBP are lumbar disc herniation, in-

tervertebral disc disease, spondylosis including facet degeneration, non-specific soft tissues injuries, spinal stenosis, and spondyloarthritis, in order of frequency (Fig. 1). History and physical examination remain the most valuable tools for the clinical assessment of LBP according to the participants. Among the LBP measurement scales, the physiatrists involved in the study were most familiar with the Oswestry Disability Index, the Low Back Pain Rating Scale, and the Rolland-Morris Disability Questionnaire, in order of popularity. Eighty percent of the participants did not request an MRI for more than half of their patients with LBP. Three-quarters of the physiatrists relied on both evidence-based guidelines and traditional clinical practice. Among the participants, 80% referred fewer than 20% of the patients with LBP to another clinical department. Patients were most often referred to neurosurgical departments, followed orthopedics, algology-pain medicine, neurological and rheumatological departments, in order of frequency (Fig. 2).

3.3. Treatment of LBP

Less than 20% of patients with LBP were treated as inpatients. NSAIDs were the most frequently recommended drugs (Fig. 3). The most common non-pharmacological treatments recommended were exercise, back care information, and physical modalities, in order of frequency (Fig. 4). The physical modalities most frequently recommended to patients with LBP included superficial heating, low frequency TENS, therapeutic ultrasound, and interferential therapy, in order of frequency (Fig. 5). Around 40% of the physiatrists in this study did not use interventional pain procedures in their clinical practice for LBP (Fig. 6). However, spinal injections and dry needling were the most frequently offered interventional treatments. Ninety-five percent of the physiatrists in the study reported that less than one-fifth of their patients with LBP were referred for surgical treatment.

4. Discussion

The present study is a preliminary report that presents the attitudes of European physiatrists to the low back pain. The results showed that physiatrists commonly dealt with patients with low back pain in their daily practice. Most of the patients were not referred to another department and treated with various conservative treatment methods. NSAIDs were the most com-

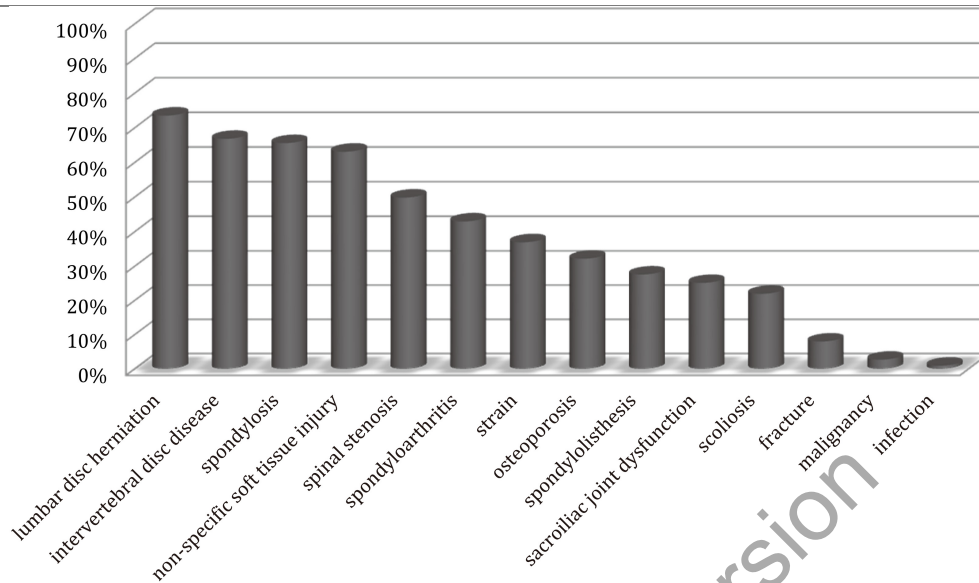


Fig. 1. The most common pathologies in patients with LBP according to the physiatrists.

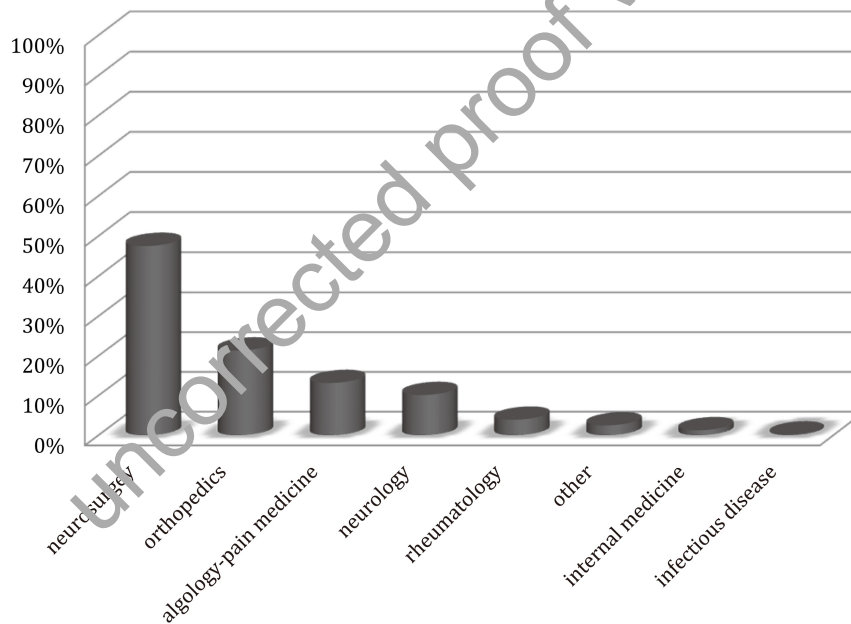


Fig. 2. Frequency of physiatrist referrals to other clinical departments for the treatment of LBP.

153 monly prescribed drugs for low back pain. Exercise, 161
 154 back care information and physical therapy were 162
 155 the most commonly preferred conservative treatments. 163

156 LBP is an important social and economic problem 164
 157 worldwide. It is one of the major causes of absen- 165
 158 teeism. Global Burden of Disease Study 2013 reported 166
 159 that burden of musculoskeletal disorders increases 167
 160 fast and the highest burden belongs to LBP [11,12]. 168

The clinicians should carefully consider the diagnosis, 161
 management, and following of LBP. The physiatrists 162
 are the physician group who mostly face to the disease 163
 in their daily practice. 164

Low back pain is raised from a specific etiological 165
 factor including infection, tumor or osteoporotic frac- 166
 tures only in 5–15% of the cases. Approximately 85% 167
 of the patients with LBP have non-specific low back 168

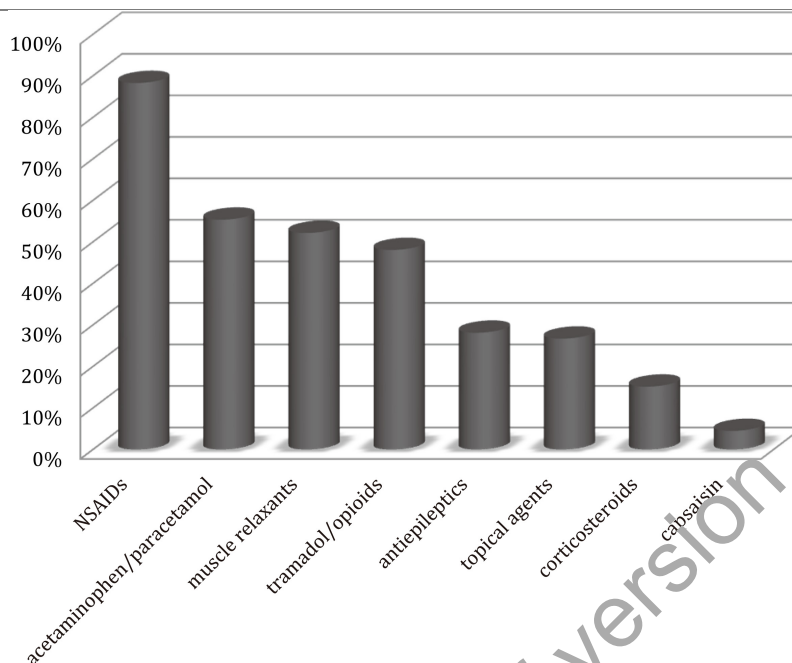


Fig. 3. Pharmacological treatments most frequently recommended to patients with LBP.

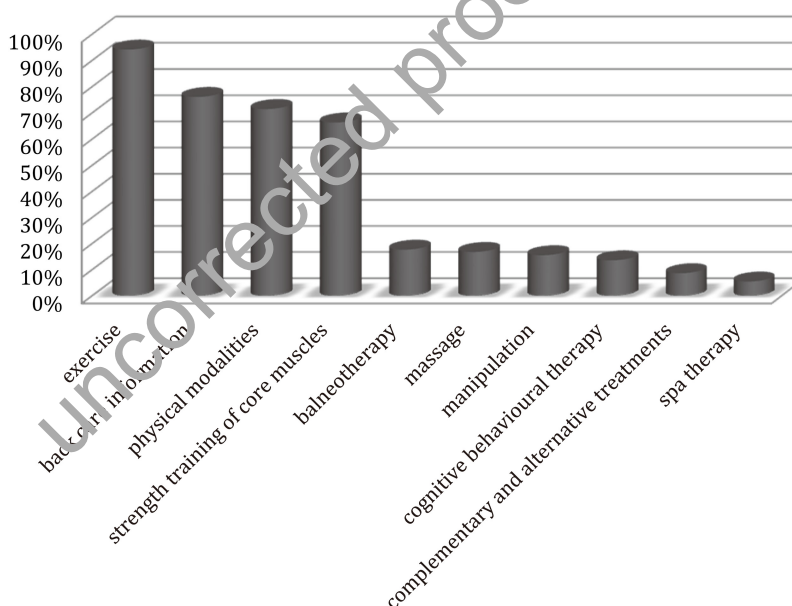


Fig. 4. Non-pharmacological treatments most frequently recommended to patients with LBP.

169 pain [13]. So, the diagnosis of the patients with LBP
 170 is a demanding process. Moreover, imaging findings
 171 and occurrence of low back pain are not strongly re-
 172 lated [14]. So, the physiatrists focus on the discrimina-
 173 tion of the patients with specific or non-specific LBP.
 174 Despite the evolving imaging techniques for spine, his-

175 tory and physical examination is still the most valu-
 176 able clinical evaluation tool for low back pain accord-
 177 ing to physiatrists. The results showed that the physi-
 178 atrists believed that they could rarely establish a clear
 179 diagnosis accounting for low back pain.

180 The underlying mechanism of nonspecific LBP is

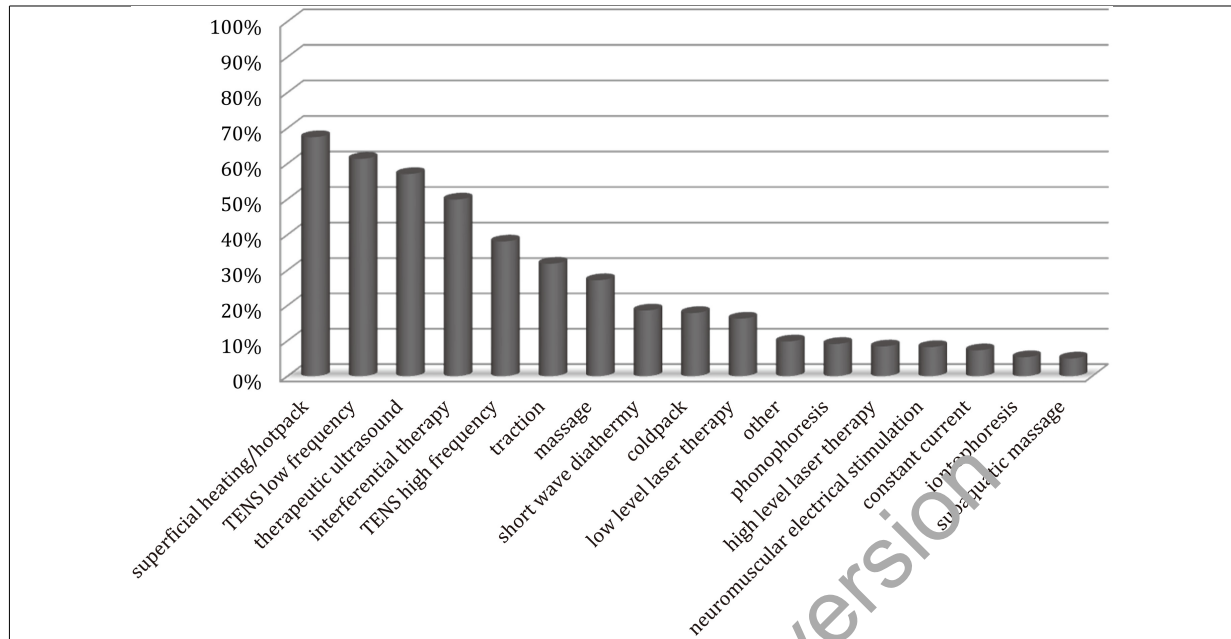


Fig. 5. Physical modalities most frequently recommended to patients with LBP.

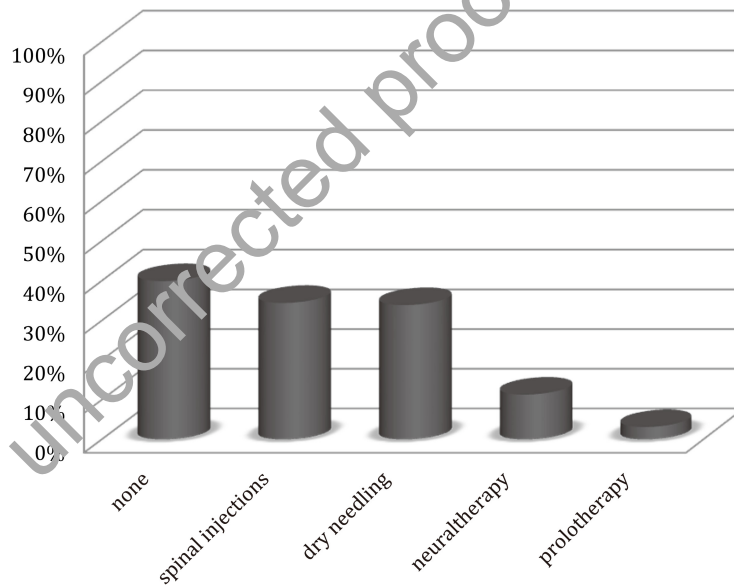


Fig. 6. Interventional treatments most frequently offered to patients with LBP.

181 likely to be multifactorial. So, establishing the pain
 182 generator is too difficult. The imaging tool can be in-
 183 adequate to discriminate underlying mechanism. The
 184 physiatrists in the study do not require MRI for more
 185 than half of the patients. Even MRI is the best imaging
 186 tool for diagnosis of patients with radicular symptoms,
 187 it can not be enough to detect whether a disc is painful.
 188 Imaging for LBP is not recommended within the first

6 weeks unless red flags are present [15]. If the clinic
 component is not definitely clear or in the presence of
 neurological deficit, MRI can be considered [16,17]. It
 is recommended that the patients with nonspecific LBP
 should be restrictive to imaging.

NSAIDs were the most commonly prescribed drugs
 for low back pain by the physiatrists. The European
 Guidelines of the management of chronic LBP recom-

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197 mends NSAIDs for pain relief in patients with chronic
198 low back pain for short-term periods (up to 3 months)
199 due to the side-effects [18]. In addition, new evidence
200 shows that paracetamol seems as ineffective for low
201 back pain [19].

202 Many non-pharmacological treatment modalities
203 have been used for treatment of LBP such as exer-
204 cise, behavioral therapy, spinal manipulation, acupunc-
205 ture and physical therapy. Exercise, back care infor-
206 mation and physical therapy were the most commonly
207 preferred conservative treatments in this study. Exer-
208 cise therapy is one of the most widely used treatments
209 for LBP. It consists of a heterogeneous group of inter-
210 ventions ranging from general physical fitness to mus-
211 cle strengthening, flexibility and stretching exercises
212 or some other specific exercise. The Guidelines rec-
213 ommend supervised exercise therapy in patients with
214 chronic low back pain [18]. Specific exercise regimens
215 such as spinal stabilization exercises, McKenzie exer-
216 cises and other specific exercise regimens are recom-
217 mended to evaluate in the further.

218 Physical therapy is one of the most commonly
219 preferred conservative treatments by the participants.
220 However, there has been little evidence to support the
221 use of most passive physical therapies (such as inter-
222 ferential therapy, short-wave diathermy, traction, ultra-
223 sound, lumbar supports, taping, and electrical muscle
224 stimulation) in the literature for low back pain [20].
225 Exceptionally, superficial heat and low-level laser ther-
226 apy have been found more effective than the sham
227 treatment. Common risk factors for treatment failure
228 of the physical therapy including smoking, workers'
229 compensation status, night pain, and psychiatric his-
230 tory should be carefully evaluated, when the manage-
231 ment of LBP is considered [21].

232 Interventional pain treatment is another option in
233 PRM practice for low back pain. More than half of
234 the physiatrists offer interventional treatments to their
235 patients with low back pain. The patients who lack
236 a strong indication for surgery, have advanced age or
237 medical comorbidities that hindered the surgery, inad-
238 equate response to conservative treatment may be can-
239 didate for the interventional treatment. Spinal injec-
240 tions and dry needling were the most widely preferred
241 techniques. The spinal injections consist of the tech-
242 niques using fluoroscopic guidance such as epidural
243 steroid injection, interlaminar approach, transforami-
244 nal approach, facet medial branch block and radiofre-
245 quency rhizotomy. Fluoroscopy-guided spinal injec-
246 tion treatments for chronic refractory low back pain
247 have been reported safe, effective, and easy to perform
248 interventions [22].

249 The physiatrist in the study reported that they re-
250 ferred rarely the patients with LBP to the surgical
251 treatment. Surgery is a treatment approach that con-
252 sidered generally less than conservative treatment for
253 LBP. In the literature, several randomized controlled
254 studies that evaluated surgical or nonsurgical treatment
255 found controversial results [23]. Appropriate patients
256 for surgery may consult with surgeon. 5.

257 5. Conclusion

258 Healthcare for patients with LBP is primarily pro-
259 vided by the physiatrists. Physiatrists with a wide-
260 range of academic degrees across Europe participated
261 in this study. It is a preliminary report that presents
262 the attitudes of European physiatrists in the manage-
263 ment of low back pain. The results showed that physia-
264 trists commonly dealt with patients with low back pain
265 in their daily practice. Most of the patients were not
266 referred to another department and treated with vari-
267 ous conservative treatment methods. NSAIDs were the
268 most commonly prescribed drugs for low back pain.
269 Exercise, back care information and physical therapy
270 were the most commonly preferred conservative treat-
271 ments. The physiatrists in the study reported that they
272 rarely referred the patients with LBP to the surgical
273 treatment. Surgery was generally considered less than
274 conservative treatment for LBP. Exercise, back care in-
275 formation and physical therapy were the most com-
276 monly preferred conservative treatments in the study.
277 The preferences in conservative treatment options may
278 vary individually. Further researches are warranted to
279 standardize the conservative management of LBP.

280 Conflict of interest

281 None to report.

282 References

- 283 [1] Urwin M, Symmons D, Allison T, Brammah T, Busby H,
284 Roxby M, Simmons A, Williams G. Estimating the burden of
285 musculoskeletal disorders in the community: the comparative
286 prevalence of symptoms at different anatomical sites, and the
287 relation to social deprivation. *Ann Rheum Dis.* 1998; 57: 649-
288 655.
- 289 [2] Stranjalis G, Tsamandouraki K, Sakas DE, Alamanos Y. Low
290 back pain in a representative sample of Greek population:
291 analysis according to personal and socioeconomic character-
292 istics. *Spine (Phila Pa 1976).* 2004; 29: 1355-1360.

- 293 [3] Hoy D, Brooks P, Blyth F, Buchbinder R. The Epidemiology
294 of low back pain. *Best Pract Res Clin Rheumatol.* 2010; 24:
295 769-781.
- 296 [4] Murray CJ, Vos T, Lozano R, Naghavi M, Flaxman AD,
297 Michaud C et al. Disability-adjusted life years (DALYs) for
298 291 diseases and injuries in 21 regions, 1990–2010: a system-
299 atic analysis for the Global Burden of Disease Study 2010.
300 *Lancet.* 2012; 380: 2197-2223.
- 301 [5] Vos T, Flaxman AD, Naghavi M, Lozano R, Michaud C, Ez-
302 zati M et al. Years lived with disability (YLDs) for 1160 se-
303 quelae of 289 diseases and injuries 1990-2010: a systematic
304 analysis for the Global Burden of Disease Study 2010. *Lancet.*
305 2012; 380: 2163-2196.
- 306 [6] Fairbank JC, Pynsent PB. The Oswestry Disability Index.
307 *Spine (Phila Pa 1976).* 2000; 25: 2940-2952.
- 308 [7] Manniche C, Asmussen K, Lauritsen B, Vinterberg H, Kreiner
309 S, Jordan A. Low Back Pain Rating scale: validation of a tool
310 for assessment of low back pain. *Pain.* 1994; 57: 317-326.
- 311 [8] Kopec JA, Esdaile JM, Abrahamowicz M, Abenham L,
312 Wood-Dauphinee S, Lamping DL, Williams JI. The Quebec
313 Back Pain Disability Scale: conceptualization and develop-
314 ment. *J Clin Epidemiol.* 1996; 49: 151-161.
- 315 [9] Roland MO, Morris RW. A study of the natural history of
316 back pain. Part 1: Development of a reliable and sensitive
317 measure of disability in low back pain. *Spine.* 1983; 8: 141-
318 144.
- 319 [10] Mayer TG, Barnes D, Kishino ND, Nichols G, Gatchel RJ,
320 Mayer H, Mooney V. Progressive isoinertial lifting evalua-
321 tion. I. A standardized protocol and normative database. *Spine*
322 *(Phila Pa 1976).* 1988; 13: 993-997.
- 323 [11] Moradi-Lakeh M, Forouzanfar MH, Vollset SE, El Bcheraoui
324 C, Daoud F, Afshin A, Charara R, Burden of musculoskele-
325 tal disorders in the Eastern Mediterranean Region, 1990–2013:
326 findings from the Global Burden of Disease Study 2013. *Ann*
327 *Rheum Dis.* 2017; 76: 1365-1373.
- 328 [12] Rasmussen-Barr E, Grooten WJA, Hallqvist J, Nohr LV,
329 Skillgate E. Are job strain and sleep disturbances prognostic
330 factors for low-back pain? A cohort study of a general popu-
331 lation of working age in Sweden. *J Rehabil Med.* 2017; 49:
332 591-597.
- [13] Deyo RA, Weinstein JN. Low back pain. *N Engl J Med.* 2001;
333 344: 363-370.
- [14] Van Tulder MW, Assendelft WJ, Koes BW, Bouter LM.
334 Spinal radiographic findings and nonspecific low back pain.
335 A systematic review of observational studies. *Spine* 1997; 22:
336 427-434.
- [15] Chou R, Qaseem A, Snow V, Casey D, Cross JT Jr, Shekelle
337 P, et al., Diagnosis and treatment of low back pain: a joint
338 clinical practice guideline from the American College of
339 Physicians and the American Pain Society. *Ann Intern Med.*
340 2007; 147: 478-91.
- [16] Allegri M, Montella S, Salici F, Valente A, Marchesini M,
341 Compagnone C, et al. Mechanisms of low back pain: a guide
342 for diagnosis and therapy. Version 2. F1000Res 5. 2016.
343
- [17] Koes BWs, van Tulder MW, Thomas S. Diagnosis and treat-
344 ment of low back pain. *BMJ.* 2006; 332: 1430-1434.
345
- [18] Airaksinen O, Brox JI, Cedraschi C, Hildebrandt J, Klaber-
346 Moffett J, et al. Chapter 4. European guidelines for the man-
347 agement of chronic nonspecific low back pain. *Eur Spine J.*
348 2006; 15(Suppl 2): S197-300.
- [19] Machado GC, Maher CG, Ferreira PH, Pinheiro MB, Lin
349 CW, Day RO, et al. Efficacy and safety of paracetamol for
350 spinal pain and osteoarthritis: systematic review and meta-
351 analysis of randomised placebo controlled trials. *BMJ.* 2015;
352 350: h1225.
- [20] Chou R, Deyo R, Friedly J, Skelly A, Weimer M, Fu R, et
353 al., Systemic Pharmacologic Therapies for Low Back Pain:
354 A Systematic Review for an American College of Physicians
355 Clinical Practice Guideline. *Ann Intern Med.* 2017; 166: 480-
356 492.
- [21] Eleswarapu AS, Divi SN, Dirschl DR, Mok JM, Stout C, Lee
357 MJ. How Effective is Physical Therapy for Common Low
358 Back Pain Diagnoses? A Multivariate Analysis of 4597 Pa-
359 tients. *Spine (Phila Pa 1976).* 2016; 41: 1325-1329.
- [22] Iannuccilli JD, Prince EA, Soares GM. Interventional spine
360 procedures for management of chronic low back pain—a
361 primer. *Semin Intervent Radiol.* 2013; 30: 307-317.
- [23] Mirza SK, Deyo RA. Systematic review of randomized tri-
362 als comparing lumbar fusion surgery to nonoperative care for
363 treatment of chronic back pain. *Spine (Phila Pa 1976).* 2007;
364 32: 816-823.