

Assessment and Management of Lateral Elbow Pain in Physiotherapy Clinical Practice: an Italian National Survey

T. Cioce¹, D. Pennella^{2,3}, F. Brindisino^{2,3}, L. Di Filippo^{3,4}, M. Salomon³, F. Maselli⁵

¹ Casa di Cura - Villa delle Terme, Florence, Italy

² Department of Medicine and Health Science Vincenzo Tiberio, University of Molise, Campobasso, Italy

³ Department of Clinical Science and Translational Medicine, University of Rome Tor Vergata, Rome, Italy

⁴ FisioAnalysis Maedica, Alessandria, Italy

⁵ Department of Neurosciences, Rehabilitation, Ophthalmology, Genetic and Maternal Infantile Sciences (DINOMGI), Campus of Savona, University of Genoa, Italy

CORRESPONDING AUTHOR:

Filippo Maselli
Department of Neurosciences,
Rehabilitation, Ophthalmology,
Genetic and Maternal Infantile Sciences
(DINOMGI)
Campus of Savona
University of Genoa
via Balbi 5
16126 Genoa, Italy
E-mail: masellifilippo76@gmail.com

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SUMMARY

Introduction. Lateral Elbow Pain (LEP) represents a disabling condition with a 1-3% prevalence in general population and a low spontaneous resolution rate within a year. This study investigated the methods of assessment and management of LEP in a sample of physiotherapists in relation to their level of experience.

Methods. We conducted a cross sectional survey consisting of 12 questions. The investigation lasted 2 months and was disseminated through the informative channels of the Italian Physiotherapists Association and by e-mail. The percentage of responses was expressed for different levels of experience in terms of years of work and number of patients with LEP seen in 1 month. Data were analyzed with the SPSS software.

Results. 1405 responses were collected. For LEP management, Psycho-Social Factors (PSFs) are more considered by the interviewees with few years of clinical practice than those who have worked for several years ($p < 0.001$; $\chi^2=36.795$); surgery is less considered as a therapeutic option by professionals who see 0-1 patients per month than those who see much more patients ($p < 0.001$; $\chi^2=20.521$). The percentage of use of manual therapy ($p=0.017$; $\chi^2=32.901$) and the use of the Maudsley and SALT tests ($p=0.012$; $\chi^2=65.360$) result higher in the group that sees more than 3 patients per month; corticosteroid infiltrations are not considered useful by those who see more than 3 patients per month compared to those who see 1 patient or none ($p < 0.001$; $\chi^2=43.632$).

Conclusions. Despite being aware of the new evidence on the etiology of LEP, only a small percentage of interviewed physiotherapists resort to adequate and specific assessment tools. Clinicians should update their patient management options to better act on the PSFs and mostly consider a multidisciplinary approach to LEP disorders.

KEY WORDS

Lateral Epicondylitis; assessment; cross sectional survey; elbow; lateral elbow pain; physiotherapy.

INTRODUCTION

Lateral Elbow Pain (LEP), a condition also known as tennis elbow, epicondylalgia, lateral epicondylitis or tendinosis, is a very common disabling condition (1): 40% of the general population experiences this problem at least once in lifetime. The most affected category seems to be manual work-

ers with high demands for strength, repetitive movements, vibrations and uncomfortable postures (1), in an age group between 35-50 years (2, 3).

This condition was described for the first time in medical literature by Runge in 1873 (4) as a chronic symptomatic degeneration of the extensor tendons of the wrist (3) and

the most involved component is the origin of the common tendon itself, on the lateral epicondyle of the humerus. LEP can also be considered a “tendinosis”, which means a chronic symptomatic degeneration of the common tendon of the extensor muscles of the forearm at the level of the lateral epicondyle of the humerus (5). To date, in literature, the term LEP underlies two different components as the origin of pain: extra-articular and intra-articular of the elbow (5, 6). Clinically, LEP presents itself as pain projected on the dorsal surface of the forearm and reduction of the gripping force, mainly present in the dominant limb (1). It often causes severe limitation of daily and sport activities (1, 7). Generally, spontaneous resolution rate within a year is low: 50% of symptoms persist for up to 18 months and 20% recur in the 3-5 years following the onset (8). This entails significant socio-economic costs (9): the resulting absenteeism from work was estimated to cost \$ 27 million in 2012 in the UK alone (10), indeed.

In the last twenty years, numerous studies have considered an integrated model for the assessment of musculoskeletal pathologies (Bio-Psycho-Social-BPS model) to explain the dichotomy between linear and gradual healing of the injured tissue and the non-linear resolution of painful symptoms (11, 12). By linear healing is meant the foreseen period for tissue healing which includes (13):

- an inflammatory phase lasting 2-4 days;
- a proliferative phase lasting about 6 weeks for the tendons (13), in which occurs collagen synthesis and deposition, the removal of inflammation mediators and the growth of the capillary vessel in the area, with a significant increase in fibroblast activity and the development of granulation tissue (13).

In particular, in LEP, to explain the persistence of pain beyond these expected times, Coombes and colleagues in 2009 (14) developed a new model, which took into account the tendon structural pathology, the consequent mechanisms that alter motor control and the biochemical justification which leads patients to persistent pain in absence of tendon pathology (14).

As far as clinical evaluation is concerned, numerous tests are cited in literature, although there is a low presence of articles with accurate descriptions of them (15, 16). The most cited are: the Maudsley test (Hsu, Moen, Levine, and Ahmad, 2012) (resisted extension of the third finger with elbow flexed at 90° and pronated forearm; it results positive for pain appearance on the lateral aspect of the joint), the Cozen test (17) (fully extended elbow and forearm in pronation; the patient is asked to resist an opposing force manually applied on the hand, closed in a punch with extended wrist and radial deviation; the test is considered positive if it reproduces pain or other symptoms in the lateral epicondyle area). Pain-Free Grip test is also described (PFG) (18): it reproduces patient’s pain (18) and measures the reduction of the gripping force (18). The Supination and Antero-Lateral pain Test (SALT) (5) and the Posterior Elbow Pain by Palpation-Extension of the Radio-capitellar joint (PEPPER) (5) are two recently described diagnostic tests, instead: they evoke the pain generated, with higher probability, from intra-articular structures. **Table I** summarizes the diagnostic accuracy values of the aforementioned tests.

During the evaluation phase, in addition to the clinical tests, it is useful to use rating scale and questionnaires to quantify entities of changes following a possible treatment. In literature, described tools for LEP are: Disability of the Arm, Shoulder and Hand (DASH) (19) for the upper limb, in general, and the Patient Rated Tennis Elbow Evaluation (PRTEE) (20), which is much more specific for the elbow; the Center for Epidemiological Studies Depression Scale (CES-D) and the Hospital Anxiety and Depression Scale (HADS) are two scales which investigate patient’s psychological state (21, 22).

Over the past decade, over 40 different techniques used in physiotherapy for the treatment of LEP have been described in over 250 clinical studies; all concluded that there is no ideal or unique treatment (23).

Given these uncertainties and due to the absence of consistent data relating to the Italian territory, the aim of this study was to investigate the methods and approaches used by Italian physiotherapists, both in the management and

Table I. Diagnostic accuracy of elbow assessment test.

Test	Sensibility %	Specificity %	PPV %	NPV %
Maudsley test	88	0	85	0
Cozen test	84	0	84	0
SALT	87.50	50	87.50	50
PEPPER	37.50	100	100	28.57

NPV: Negative Predictive Value; PEPPER: Posterior Elbow Pain by Palpation Extension of the Radio-capitellar joint; PPV: positive predictive value; SALT: Supination and Antero-Lateral Pain Test; %: percentage.

in the assessment of LEP, in relation to the level of their professional experience, in terms of years of work and the number of patients with LEP seen in 1 month. Moreover, we assessed their adherence to the most recent scientific evidence-based literature.

Considering LEP as a disabling condition with high recurrence rates, it could be helpful to understand and observe the management activities of Italian physiotherapists in evaluating and treating such clinical condition in such a way to fill any gaps in the spectrum of Italian physiotherapist's competence.

On the other hand, concrete and favorable answers could be given in relation to the patients' requests, for example in the context of reduction of painful symptoms, dejection of direct and indirect costs related to this condition, restoration of better quality of life. To the authors' knowledge, this is the first study to investigate this field.

METHODS

Study design

The study was designed as a cross-sectional observational study based on the administration of questionnaires both directly on paper and in web mode, based on the guidelines of Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) (for the paper questionnaire) (24) and the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) (for the online questionnaire) (25). The questionnaire was designed with reference to similar questionnaires (26, 27) and with the consent of 10 experts OMPT physiotherapists (Orthopedic Manipulative Physical Therapist) with at least 5 years after specialization experience.

Survey structuring

The questionnaire consisted of 12 questions (**Appendix 1-Questionnaires**), all designed with multiple answers, with a completion time estimated by the software of 3 minutes and distributed in 1 single page. Authors chose to structure the survey in this way since it has been shown that, although the "ideal" duration of a survey varies according to the topic, population and context, a positive impact on completion rates of the survey was found if minimum length is guaranteed (one or two pages, at most) (28, 29). Questions identified with Q5, Q8 and Q9 had, as additional answer field the choice "Other", with the obligation to specify alternative answers to those present in the text box. The first three questions (Q1-Q3) collected information on the professional sphere and were used to understand the

level of work experience of our target population (years of work, work setting, number of patients with LEP assessed in a month). The other nine questions (Q4-Q12) were specific for the assessment and management of LEP, in particular regarding to which anatomical structures were considered during patient's evaluation, which were the most commonly used clinical tests, which considerations the physiotherapists have towards psychosocial factors, the weight of the instrumental diagnostic investigations and the role of surgical and/or infiltrative treatment.

The survey was analyzed by a panel of ten experts physiotherapist with extensive experience in survey design in order to increase its internal consistency and technical functionality of the electronic questionnaire (30); all physiotherapists were professionals with more than 5 years of experience in the treatment of upper limb pathologies and, in particular, of the elbow district. The survey could be checked and modified at the end of the compilation before sending it. Experts worked independently on the questionnaire and agreed on the final version of the questionnaire with respect to the terms, feedback, questions and structure of the survey, which was gradually enriched with their suggestions.

When agreement was reached, a preliminary version of the survey was administered to a sample of 20 physiotherapists to increase the content validity of the survey itself. When the pilot internship was completed, experts conducted a one-to-one interview with the 20 physiotherapists about the possible difficulties encountered during the survey (for example, identifying questions which required further explanation, too difficult question formulation, possibility of respondents seemed to be confused in answers). During the pilot stage, no ambiguous questions emerged, the words used were simple and easy to understand, therefore no change was necessary.

Ethical approving

This study was approved by the Ethics Committee of the Local Health Authority of Lecce on March 7, 2019 with protocol number 30/2019. The complete version of the survey, in Italian and English language, is available as supplementary material (**Appendix 1- Questionnaires**).

Sampling and recruitment

The questionnaire was addressed to all professionals with a degree in physiotherapy and practitioners in Italy. The questionnaire was spread through:

- informative channels of the Italian Physiotherapists Association (A.I.F.I.);

- social media (Facebook and WhatsApp);
- direct e-mail contacts of physiotherapists.

An electronic invitation form and an information letter were provided to all participants (**Appendix 2** - Information letter). The questionnaire could be only completed once per email address. Before starting the compilation of the questionnaire, written informed consent was requested.

Data collection

The survey was available on the SurveyMonkey® platform (www.surveymonkey.com) for 2 months from March 20th to May 20th. Two months are considered a reasonable time for data acquisition (31), also because no further request for completing the questionnaire has been registered after this date. The estimated sample size was 1050 respondents, calculated with a dedicated software within the Sample Size Calculator platform (<https://www.surveymonkey.com/mp/sample-size-calculator>), considering a 95% Confidence Level, a margin of error of 3%. Target population has been identified in all the Italian physiotherapists surveyed by AIFI, with a number equal to 65000 (<https://aifi.net/censimento-aifi-italia-65mila-fisioterapisti/>). The collected data were stored in the software, protected by an access password.

Analytical procedures

The SurveyMonkey® software allowed us to extrapolate the raw data and export it into Microsoft Excel. The data were analyzed with SPSS Statistical Software (Version 25.0. Armonk, NY: IBM Corp).

The demographic information was entirely analyzed and used to define the characteristics of the studied population, the level of experience and the number of patients seen in 1 month. Each question relating to the assessment and management of the patient with LEP (Q4-Q12) was evaluated in relation to the level of experience of the subject interviewed (Q1-Q3). The percentage of responses for different levels of experience was expressed through proportions.

Based on the type of data being analyzed (dichotomous and categorical variables), the Chi-Square Test (χ^2) was chosen to highlight the presence of significant differences in the comparison between the various proportions. For this test, a p-value < 0.05 was assumed as significant.

Subsequently, to identify the responsible couples for this existing difference, the z-test was used with a p-value adjusted according to the “Bonferroni correction for multiple comparisons”.

RESULTS

A total of 1405 responses were collected with a 100% completion rate and an average time taken of 3 minutes and 25 seconds to fill the question form. Most of the responses to the survey were collected during the first week, the number drastically reduced in the following 3 weeks and then peaked again in the fifth week (when the questionnaire was disseminated by the A.I.Fi. informative channels). The data collected showed that the majority of respondents (32.23%) have been working as physiotherapists for less than 5 years, in a private study (63.46%) and visit less than 2 LEP patients per month (**table II**).

Most of respondent (78.23%) considered both the insertion tendon of the extensor muscles of the carpus and fingers as well as the myo-tendon junction of the extensor muscles of the carpus and fingers and the humerus-radial and radio-ulnar joint responsible for pain in a patient with LEP.

The most used clinical tests during the evaluation, in order of frequency, were: the Cozen Test (63.81%), the Maudsley Test (46.82%), SALT (23.79%) and PEPPER (21.50%) Test. Almost all the respondents (88.95%) considered that Psychosocial Factors (PSFs) can significantly influence the natural history and management of the patient with LEP. Of these, most adopt multiple strategies for managing psychosocial factors (patient education, cognitive behavioral approach).

The rating scales and questionnaires mainly most used with this type of patient were the DASH (57.81%) and the PRTEE (38.12%). Other response have been entered (19.54%), using option box “Other”.

Table II. Information on the professional dimension.

Q1-Q3	n=1405
Year of clinical practice	%
0-5	32.23
5-10	28.94
10-20	23.93
>20	19.90
Setting	%
Private study	63.46
Nursing home	5.89
Hospital	12.49
Affiliated clinica	18.16
Number of patients/month	%
0-1	46.59
1-2	29.53
2-3	14.48
>3	9.39

LEP: Lateral Elbow Pain; n: respondents; %: percentage.

Significant 63.96% of respondents considered instrumental diagnostic investigations (Magnetic Resonance Imaging, Computed Tomography, Ultrasonography) useful in the presence of signs and symptoms that suggest a pathology of non-physiotherapeutic competence. A reduced percentage expressed specific cases for which the use of diagnostic investigations is relevant or consider these investigation tools “always” or “useful”.

Surgery intervention is considered a therapeutic alternative in case of persistent LEP only by 29.54% of physiotherapists. Most of the physiotherapists (38.31%) didn't consider corticosteroid infiltrations to be useful in a patient with LEP, the others considered them useful only in a certain phase of the pathology.

Most respondents (37.61%) used Therapeutic Exercise (TE) combined with Manual Therapy (MT) as proper conservative approach; smaller percentages used a unimodal approach. All the results to these answers were summarized in **table III**.

Analyzing the methods of assessment and management of LEP (Q4-Q12) in relation to the level of experience of physiotherapists, it emerged that:

- who has more years of clinical practice (> 20), did not consider that psychosocial factors may influence the natural history and management of the patient with LEP with a significantly higher percentage than all the others ($p < 0.001$; $\chi^2=36.795$) (**figure 1**);
- there was no significant difference between the groups with several years of experience and the consideration of surgery as a therapeutic alternative in persistent LEP ($p=0.258$; $\chi^2=4.031$) (**figure 2**);
- the use of the Maudsley and SALT clinical tests was significantly greater in the group that saw more than 3 patients per month compared to “0-1” and “1-2” ($p=0.012$; $\chi^2=65.360$) (**table IV**);
- those who saw 0-1 patients in 1 month considered surgery less useful than those who saw more patients ($p < 0.001$; $\chi^2=20.521$) (**figure 3**);
- in relation to the question “Do you consider corticosteroid infiltrations useful in a patient with LEP?”, the answer “No” was significantly greater in the group “over 3” compared to “0-1”; the answer “I don't know” was significantly greater in the group “0-1” than in “2-3” and “beyond 3”; the answer “Yes, in chronic patient” was significantly greater in the group “2-3” compared to “0-1” and “1-2” ($p < 0.001$; $\chi^2= 43.632$) (**figure 4**);
- the percentage of TM use was significantly higher in the group that saw more than 3 patients in 1 month compared to the group that saw 0-1 and 1-2 patients in 1 month ($p=0.017$; $\chi^2=32.901$) (**figure 5**).

Table III. Assessment and management of the patient with LEP.

Q4-Q12	
Anatomical structure that cause pain	%
CED and EC tendon	10.63
CED and EC myo-tendinous junction	6.75
Joint and surroundings tissues	4.38
All mentioned structures	78.23
Clinical test used	%
Cozen	63.81
Maudsley	46.82
SALT	23.79
PEPPER	21.50
Others	16.91
Considerations on PSFs	%
Yes	88.95
No	11.05
Used strategies in the management of PSFs	%
Pain neurophysiology education	28.69
Cognitive-behavioral approach	9.43
Encouragement on active life style	28.62
All mentioned	60.22
Evaluation scale and questionnaires	%
PRTEE	38.12
DASH	57.81
CES-D	2.55
HADS	5.02
Others	19.54
Usefulness of diagnostic investigation (CT, MRI, USI)	%
Never	1.51
Always	5.74
Instability	8.97
Visible acute signs of inflammation	5.81
Non-physiotherapeutic competence pathology	63.96
Non-feasible conservative treatmente	12.28
Others	1.72
Consideration on surgery in LEP > 6 months	%
Yes	29.54
No	70.46
Usefulness of corticosteroids injections	%
No	38.31
Always	0.65
Acute phase	16.71
LEP > 6 months	23.39





Q4-Q12	
Anatomical structure that cause pain	%
I don't know	20.95
Conservative treatment	%
TE	7.78
MT	12.75
B	1.08
TE+MT	37.61
TE+B	2.81
MT+B	4.90
TE+MT+B	33.07
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Q4-Q12	
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Others	1.72
Consideration on surgery in LEP > 6 months	%
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No	70.46
Usefulness of corticosteroids injections	%
No	38.31
Always	0.65
Acute phase	16.71
LEP > 6 months	23.39
I don't know	20.95
Conservative treatment	%
TE	7.78
MT	12.75
B	1.08
TE + MT	37.61
TE + B	2.81
MT + B	4.90
TE + MT + B	33.07

B: bracing; CES-D: Center for Epidemiological Studies Depression Scale; CT: Computed Tomography; DASH: Disabilities of the Arm, Shoulder and Hand; EC: Extensor of the carpus; ECD: Extensor common digits; TE: Therapeutic Exercises; PSFs: Psycho-social factors; HADS: Hospital Anxiety and Depression Scale; LEP: Lateral Elbow Pain; MRI: Magnetic Resonance Imaging; MT: Manual Therapy; PEPPER: Posterior Elbow Pain by Palpation Extension of the Radio-capitellar joint; PRTEE: Patient-Rated Tennis Elbow Evaluation; SALT: Supination and Antero-Lateral Pain Test; TE: Therapeutic Exercise; USI: Ultrasound Imaging; %: percentage.

DISCUSSIONS

The purpose of this study was to find out which LEP assessment and management strategies are in relation to the level of experience of the Italian physiotherapists. In 2010, McDermid and his team (32) conducted a similar study in Canada concluding that their clinical practice was aligned with literature despite the lacking an optimal definition of education and exercise as tools rehabilitation (32). From the analysis of the results of the present study, it emerged that about half of the sample treats none or at most one patient per month with this problem: this may be defined as a general poor experience regarding the LEP by the respondents. However, most of the respondent, updated with the most recent evidence-based literature on the etiology of LEP, believe that the main cause of the problem is multifactorial (5, 6, 14), recognizing as pathogenic "noxa" not only the

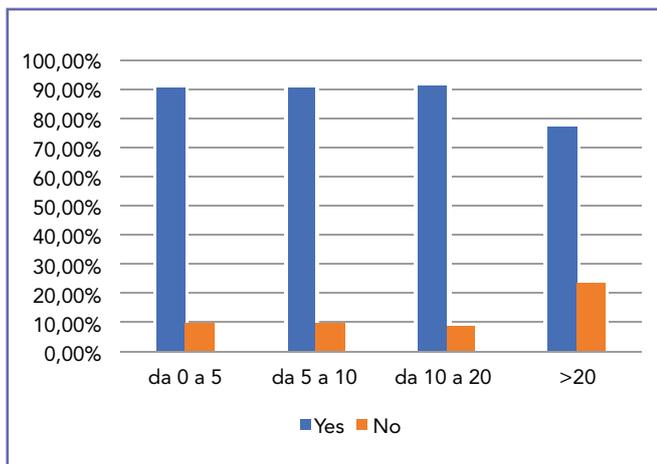


Figure 1. Comparison of proportions between considerations on PSFs and numbers of years of clinical practice. ($p < 0.001$; $\chi^2=36.795$).

*: "No" significantly different between "> 20" and "0-5"; ^: No significantly different between "> 20" and "10-20"; †: No significantly different between "> 20" and "5-10".

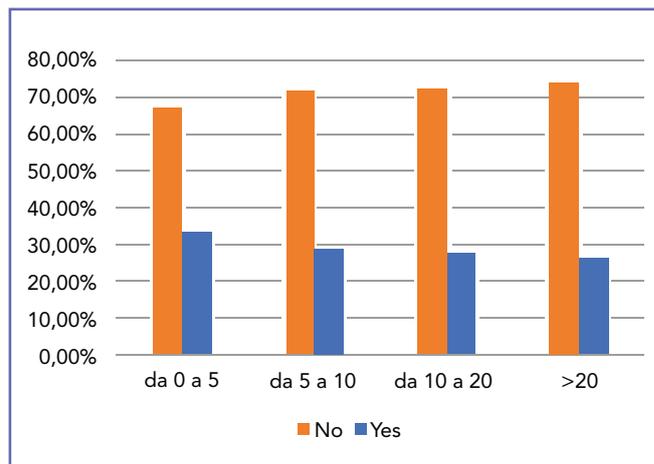


Figure 2. Comparison between proportions of surgery considerations and years of clinical practice. Do you consider corticosteroid infiltrations useful in a patient with LEP? $p=0.258$; $\chi^2=4.031$.

Table IV. Comparison between proportions of clinical tests and patients/months.

	0-1	1-2	2-3	> 3
Q5				
None	14.6%	15.5%	16.3%	15.1%
C	22.9%	23.5%	17.8%	13.7%
M	11.5%	11.4%	11.9%	16%
S	4.2%	5.6%	3.5%	4.6%
P	3.7%	4.6%	3.5%	5.3%
C + M + S + P	7.1%	4.9%	6.4%	4.6%
C + M + S	1.4%	1%	2%	0.8%
C + M	21.7%	20.9%	24.8%	20.6%
M + S	0.8% ^	0.2% *	2%	6.1%
M + S + P	0.3%	0.5%	1%	0%
S + P	4.2%	1.7%	3%	5.3%
C + S + P	1,5%	1.2%	1%	0%
C + S	3.1%	5.1%	5%	4.6%
C + P	2.5%	2.4%	1.5%	3.8%
C + M + P	0.6%	1.5%	0.5%	0%

$p=0.012$; $\chi^2=65.360$

*: "M + S" significantly different between "1-2" and "> 3"; ^: "M + S" significantly different between "0-1" and "> 3"; C=Cozen's Test; M=Maudsley Test; P=PEPPER Test; S=SALT Test.

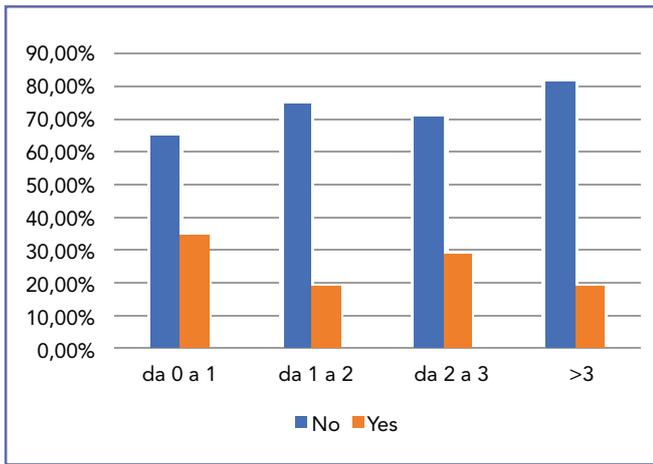


Figure 3. Comparison between proportions of surgery and patients/months. Do you consider corticosteroid infiltrations useful in a patient with LEP? $p < 0.001$; $\chi^2=20.521$.
*: "No" significantly different between "0-1" and "1-2"; ^: No significantly different between "0-1" and "> 3".

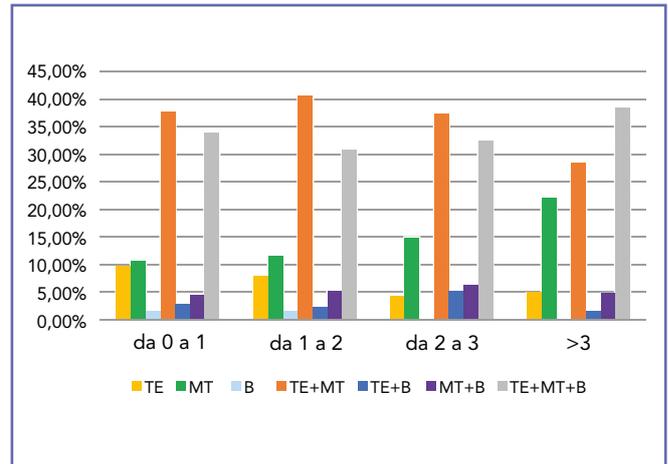


Figure 5. Comparison between proportions of use on corticosteroid injections and number of patients/months. What kind of conservative approach do you use? $p=0.017$; $\chi^2=32.901$.
*: "MT" significantly different between "0-1" and "> 3"; ^: "MT" significantly different between "1-2" and "> 3"; B: Bracing; MT: Manual Therapy; TE: Therapeutic Exercise.

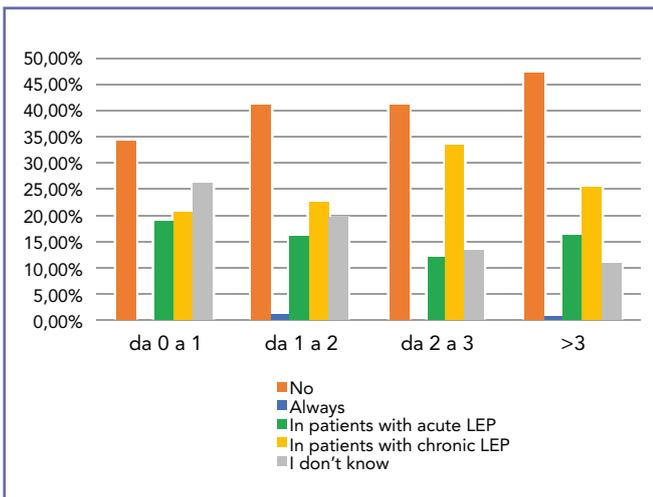


Figure 4. Comparison between proportions of use on corticosteroid injections and patients/months. Do you think corticosteroid infiltrations are useful in a patient with LEP? $P < 0.001$; $\chi^2=43.632$.
*: "No" significantly different between "0-1" and "> 3"; ^: "I don't know" significantly different between "0-1" and "> 3"; +: "I don't know" significantly different between "0-1" and "2-3"; α: "Yes, in a chronic patient" significantly different between "0-1" and "2-3"; #: £: "In a chronic patient" significantly different between "0-1" and "1-2".

tendon component (33-36). In 2017, the study conducted by Arrigoni *et al.* (6) hypothesized the existence of a specific sub-category of patients, in which the joint complex could play a predominant role in LEP.

Moreover, most of the respondents declared to consider PSFs (1, 37-39) to have a significant influence on natural history and in the management of the patient with LEP; they also declared to adopt specific strategies in this regard. Therefore, it was possible to state that the paradigm of the person as a Biopsychosocial entity (BPS) found its clinical application in LEP (40-42). Nevertheless, only very small percentage of professionals resort to evaluation scales like CES-D and HADS. Strategies used for the management of PSFs were often considered and individually used by the respondents, thus not maximizing the effect of a treatment based on the BPS model, which instead promoted the use of multiple treatment strategies and techniques (12).

Regarding clinical tests, SALT and PEPPER tests was proposed in battery only by 11% of our respondents. It was important to remember that the scientific evidence which demonstrates the usefulness of these two tests was rather recent (5) and this could explain their scarce diffusion. Saroja in 2014 (43) verified the diagnostic accuracy of the Cozen, Maudsley and Mills tests (table I). Through this questionnaire, it emerged that Cozen and Maudsley tests

were used more frequently during the evaluation of a patient with a suspected LEP (**table III**). In a very recent systematic review (44), it emerged that a lot of clinical tests for elbow pathologies were described in literature, but none can provide adequate certainty to rule in or rule out a disease based on sufficient diagnostic accuracy.

Still with regards to assessment procedures, more than half of the respondents declared to mainly use the DASH questionnaire, which is not specific for elbow diseases such as PRTEE. DASH questionnaire was validated in Italian on 108 patients with upper limb problems, of which only 25 affected by epicondylitis (19). It was highly probable that this small number of patients was due to sampling procedure and a low prevalence of LEP disorders compared to other pathologies of the upper limb (45) (**table III**).

More than half of the respondents considered imaging studies (46-48) as an useful option in the presence of signs and symptoms that suggest a specific pathology of non-physiotherapeutic competence, like cases in which a multidisciplinary assessment would be more appropriate (**table II**). This could be due to the fact that, in Italy, physiotherapists could not prescribe diagnostic imaging investigations. Therefore, Italian physiotherapist were not used to supplement imaging independently as support for clinical practice. For the management of LEP, we can distinguish between conservative treatment (exercise, manual therapy, brace), injections and surgical treatments. In literature it was recommended to use a conservative approach in the first few months (49) but it would be also appropriate to know how to recognize when conservative treatment was no more effective. This was possible through an accurate medical history and a greater use of dedicated clinical tests (5, 17, 18, 26) in order to evaluate alternative strategies for the resolution of symptoms, such as surgery (50-52) and corticosteroid infiltrations (53).

Surgery

Most respondents (70.46%) did not consider surgery as a therapeutic alternative. Regarding this treatment option, a Cochrane systematic review published in 2011 (54) concluded that there is insufficient evidence to support or reject its efficacy due to a small number of studies, a large heterogeneity in the interventions, samples of small size and poor recording of results (54). Common surgical procedures may be performed via percutaneous, arthroscopic, or open approaches (55). A systematic review conducted in 2018 (56) highlights no difference between open surgery and arthroscopy, in terms of efficacy, while it suggests that arthroscopic procedures are associated with less complications (56). Recently, a review of Stover *et al.* highlighted

how Ultrasound-Guided Tenotomy (USGT) represented a minimally invasive treatment option for recalcitrant cases to conservative management (57).

Injections

Corticosteroid injections showed to produce substantial short-term pain relief (53, 58, 59), unexpected with the lack of inflammatory biomarkers in tendinopathy (60, 61).

A plausible explanation was that placebo and contextual effects (62-64) may be associated. In the long term, no evidence of efficacy was found (53, 58, 65), due to the high recurrence rates, the risks of fibrosis, adiponecrosis and calcification, as well as the worsening of the clinical course (62, 66). In a randomized controlled trial with 1-year follow-up (53), recurrence of symptoms was evident in 72% of patients treated with corticosteroid injection compared to 8% after physiotherapy treatment (elbow manipulation, therapeutic exercise and education). Coombes *et al.* in 2009 (67) conducted a clinical study that highlighted how the combined approach (physiotherapy + corticosteroid injections) is preferred to infiltration alone (67).

Although still with few supporting studies, collagen infiltrations were also used and should be considered for future research to enhance available tools to clinicians (68). Several studies have investigated also the use of topically-applied steroids for tendon pain treatment, demonstrating a positive effect on pain in patients with LEP: most advantages reside in their safety application and being well tolerated (69).

Conservative Treatment

As far as the conservative treatment was concerned, the majority of respondents declared to use a multimodal approach (37.61% TE + MT, 33.07% TE + B + MT) (**table III**).

Appreciating the therapeutic success (7), in 2003 Vincenzino and colleagues (70) considered therapeutic exercise the main strategy for the management of LEP together with additional procedures such as manipulative therapy (71, 72) and sports taping (73) techniques. These showed to provide substantial relief from initial pain, to speed up recovery processes and to motivate the patient to adhere to the proposed exercise program. Indeed, a recent systematic review (74) concluded that the majority of consistent findings supported the inclusion of eccentric exercise as part of a multimodal therapy programme due to its effect on improved outcomes in patients with LEP (74).

The protective brace had also proven to be effective for short-term pain reduction (75, 76), but no more effective than other strategies such as shock-wave therapy (77, 78).

Therefore, it was not possible to define which is the best treatment for LEP, which must be researched taking into consideration: the experience of the team, the availability of the specific equipment, the clinician experience and expertise and the patient's responses (79).

CONCLUSIONS

Most of the respondents are updated with the most recent scientific evidence on the etiology of LEP.

It is plausible that, for musculoskeletal pathologies management, in addition to focusing on improving manual skills, clinicians should also update their diagnostic framing skills and their ability of taking in charge patients. It is important that clinicians also take into account that they can, and should, consider and act on the PSFs. In addition, a multidisciplinary type of assessment and management should be increasingly considered, which is hoped for the given complexity of this disorder. The main goal is to avoid mistakes or diagnosis delays, to avoid the development of chronic symptoms in presence of because worst results, to ethically inform patients of the heterogeneity of the treatment and the natural history of LEP. Such behavior can come true only with a consistent improvement of the medical and health culture.

Perspectives

We have noticed that heterogeneous clinical labelling of lateral elbow pain is found in the literature, also taking into consideration some manuscripts that investigate the psychosocial aspects (40-42).

Therefore, we believe that:

1. a common agreement must be reached soon in scientific community toward the most appropriate terminology used to identify this clinical condition;
2. inclusion criteria used so far in literature could represent a gap to be filled, as probably factors involved in the genesis of the pathology are manifold and could be indicators of specific subgroups with probable different response to the proposed therapeutic pathways;
3. two different subgroups of patient with lateral elbow pain could be identified, where the intra- (5, 6, 80) or extra-articular (5) component is responsible for most of the symptoms referred by patients, being aware that more likely there is never a single and exclusive involvement of a single structure.

For this reason, we decided to identify a unique terminology to define, respectively, the pain in the elbow with an etiological share of the myo-tendon compartment or of the

functional component (non-Specific Lateral Elbow Pain – nSLEP) and the pain most likely to be sustained by problems affecting the osteo-articular component, or true structural component (Specific Lateral Elbow Pain – SLEPs) (81).

The terminology nSLEP and SLEPs refers to a classification proposal of lateral elbow pain, with its relative decision-making algorithm, inherent to the research strand of this work. Moreover, we decided to follow principles and recommendations in clinical and field Science Research (82).

LIST OF ABBREVIATIONS

nSLEP: non-Specific Lateral Elbow Pain
 B: Bracing
 BPS: Bio-Psycho-Social
 CES-D: Center for Epidemiological Studies Depression Scale
 CHERRIES: Checklist for Reporting Results of Internet E-Survey
 CT: Computed Tomography
 DASH: Disabilities of the Arm, Shoulder and Hand
 HADS: Hospital Anxiety and Depression Scale
 LEP: Lateral Elbow Pain
 MRI: Magnetic Resonance Imaging
 MT: Manual Therapy
 OMPT: Orthopedic Manipulative Physical Therapist
 PEPPER: Posterior Elbow Pain by Palpation-Extension of the Radio-capitellar Joint
 PGF: Pain-Free Grip
 PRTEE: Patient Rated Tennis Elbow Evaluation
 PSFs: Psychosocial Factors
 Q: Question
 SALT: Supination and Anterolateral Pain Test
 SLEPs: Specific Lateral Elbow Pain
 SPSS: Statistical Package for Social Science
 STROBE: Strengthening the Reporting of Observational Studies in Epidemiology
 TE: Therapeutic Exercise
 USI: Ultrasound Imaging

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ETHICS STATEMENT

This study was approved by the Ethics Committee of Lecce (Italy) on March 7, 2019 with protocol number 30/2019.

Written informed consent was requested by the used software before starting the questionnaire.

CONFLICT OF INTERESTS

The authors declare that they have no conflict of interests.

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APPENDIX 1

QUESTIONNAIRES

Q1 - How many years of experience do you have as a physiotherapist?

- 0-5
- 5-10
- 10-20
- > 20

Q2 - In which job setting do you work?

- Public health system (hospital)
- Private Practice
- Nursing home (private or in convection with the national health system)
- Retirement home

Q3 - How many patients with lateral elbow pain (LEP), a condition also known as tennis elbow or epicondylalgia or lateral epicondylitis, do you visit each month?

- From 0 to 1
- From 1 to 2
- From 2 to 3
- Over 3

Q4 - Which anatomical structures do you think may be the cause of pain in a patient with LEP?

- Common insertion tendon of the extensor muscles of carpus and fingers
- Myotendinous junction of the extensor muscles of carpus and fingers
- Humero-radial and radio-ulnar joint, including surrounding tissues (capsule and ligaments)
- All the structures mentioned above

Q5 - Which clinical tests do you use most often when evaluating a patient with probable LEP? (it is possible to mark more than one box)

- Cozen's Test
- Maudsley Test
- Salt Test
- Pepper Test
- Other (specify)

Q6 - Do you consider that psycho-social factors can significantly influence the natural history and management of the patient with LEP and do you possibly adopt specific strategies in this regard?

- Yes
- No

Q7 - If you answered 'YES' to question 6, which strategies do you use? (it is possible to mark more than one box)

- Pain neurophysiology education
- Cognitive-behavioral approach
- Counseling: encouraging the patient to maintain an active lifestyle
- All the above mentioned

Q8 - In daily clinical practice, which assessment scales and questionnaires do you use with this kind of patient? (it is possible to mark more than one box)

- Patient-Rated Tennis Elbow Evaluation (PRTEE)
- Disabilities of the Arm, Shoulder and Hand (DASH)
- Center for Epidemiological Studies Depression Scale (CES-D)
- Hospital Anxiety and Depression Scale (HADS)
- Other (specify)

Q9 - In your clinical practice, when do you think instrumental diagnostic investigations (MRI, CT, Ultrasound etc.) are useful in some cases of LEP?

- Never
- Always
- In case of significant disability
- In case of visible acute inflammatory signs
- In presence of signs and symptoms that make one suspect of non-physiotherapy competence pathology
- In the case the patient can not be subjected to conservative treatment
- Other (specify)

Q10 - Do you consider surgery a therapeutic alternative in case of LEP lasting for over 6 months?

- Yes
- No

Q11 - Do you consider corticosteroid injections useful in a patient with LEP?

- NO
- Yes, always
- Yes, in patient with LEP in acute phase
- Yes, in chronic patient (over 6 months)
- I do not know

Q12 - Which kind of conservative approach to you mostly adopt?

- Therapeutic exercise (TE)
- Manual therapy (MT)
- Protection bracing
- TE + MT
- TE + bracing
- MT + bracing
- TE + MT + bracing

APPENDIX 2

INFORMATION LETTER

Dear colleague,

I ask for your collaboration for the achievement of a prevalence observational study which aims to investigate the methods of approach used by Italian physiotherapists in the assessment and management of lateral elbow pain (LEP).

This study has already obtained the approval of the Ethics Committee of Lecce (ASL Lecce, Minutes n.30, 7 March 2019 - Elbow Lateral Pain Survey) and is entirely conducted by the University of Rome "Tor Vergata" - Master's Degree in Applied Manual Therapy to Physiotherapy.

Therefore, we submit a simple questionnaire of 12 questions, made on the basis of the most recent scientific literature in collaboration with the following colleagues: Brindisino Fabrizio, Di Filippo Luigi, Maselli Filippo, Pennella Denis and Salomon Mattia.

Reading and completing the questionnaire anonymously takes only three minutes.

(link: <https://it.surveymonkey.com/r/5P8SRLW>)

Trusting in your collaboration, thank you and kindly best regards.