REVIEW DERLEME

DOI: 10.5336/jtracom.2023-97899

Effects of Reflexology Practices on Quality of Life in Türkiye: A Systematic Review

Türkiye'de Refleksoloji Uygulamalarının Yaşam Kalitesine Etkileri: Sistematik Bir Derleme

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ABSTRACT One of the frequently used complementary health practices is reflexology. Reflexology may be helpful for various health disorders and enhance quality of life, according to research findings. However, before it can be widely used for health promotion, strong evidence of efficacy and safety must be demonstrated. The purpose of this systematic review is to assess the clinical trials completed in Türkiye to investigate the influence of reflexology on quality of life and to provide a conclusion with more evidentiary value to the literature. The review questions are (a) How does reflexology affect people's quality of life? (b) In what circumstances does reflexology usage affect a person's quality of life? (c) What suggestions are there for more research? Reflexology can reduce symptoms in conditions such as low back pain, irritable bowel syndrome, constipation, menopause, cancer (cervix, endometrial or ovarian, colorectal cancers), multiple sclerosis, overactive bladder and spastic cerebral palsy and can improve quality of life. However, although reflexology is an effective technique, the lack of research with a low risk of bias prevents any concrete recommendations from being made. Quality clinical trials evaluating the effectiveness of reflexology in improving quality of life appear to provide less than expected evidence. In conclusion, the factors used to evaluate the quality of studies in this review should be considered and, future research should focus on improving study quality.

Keywords: Reflexology; quality of life; systematic review

ÖZET Sık kullanılan tamamlayıcı sağlık uygulamalarından biri de refleksolojidir. Araştırmaların bulgularına göre refleksoloji, çeşitli sağlık sorunları için yararlı olabilir ve yaşam kalitesini artırabilir. Bununla birlikte, sağlığın teşviki ve geliştirilmesi için geniş çapta kullanılmadan önce etkinliğinin ve güvenliğinin güçlü kanıtları gösterilmelidir. Bu sistematik derlemenin amacı, refleksolojinin yaşam kalitesi üzerindeki etkisini araştırmak için Türkiye'de tamamlanan klinik araştırmaları değerlendirmek ve literatüre kanıt değeri yüksek bir sonuç sunmaktır. İnceleme soruları şunlardır: (a) Refleksoloji insanların yaşam kalitesini nasıl etkiler? (b) Refleksoloji kullanımı hangi durumlarda kişinin yaşam kalitesini etkiler? (c) Daha fazla araştırma için hangi öneriler sunulabilir? Refleksoloji; bel ağrısı, irritabl bağırsak sendromu, kabızlık, menopoz, kanser (serviks, endometriyal veya over, kolorektal kanserler), multipl skleroz, aşırı aktif mesane ve spastik serebral palsi gibi durumlarda semptomları azaltabilir ve yaşam kalitesini artırabilir. Ancak refleksoloji etkili bir teknik olmasına rağmen ön yargı riski düşük olan araştırma eksikliği herhangi bir somut tavsiyede bulunulmasını engellemektedir. Refleksolojinin yaşam kalitesini iyileştirmedeki etkinliğini değerlendiren kaliteli klinik çalışmaların beklenenden daha az kanıt sağladığı görülmektedir. Sonuç olarak bu derlemede çalışmaların kalitesini değerlendirmede kullanılan faktörler göz önünde bulundurulmalı ve gelecekteki araştırmalar çalışma kalitesini iyileştirmeye odaklanmalıdır.

Anahtar Kelimeler: Refleksoloji; yaşam kalitesi; sistematik inceleme

TO CITE THIS ARTICLE:
Uskun E, Çırak M. Effects of reflexology practices on quality of life in Türkiye: A systematic review. J Tradit Complem Med. 2024;7(1):136-50.

Treatment approaches other than modern medicine are defined by World Health Organization (WHO) as Complementary and Alternative Therapy.[1] Complementary health approach has a significant impact on health services and it is a topic of increasing interest today.[2] The increase in non-communicable

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Peer review under responsibility of Journal of Traditional Medical Complementary Therapies.

Received: 09 May 2023 ***Received in revised form:*** 23 May 2023 ***Accepted:*** 29 May 2023 ***Available online:*** 01 Jun 2023

(chronic) diseases with the aging population, especially the helplessness experienced in cancer and autoimmune system diseases, has led individuals to practices other than modern medicine.[3-6] The reasons for its current popularity are certainly complex and are thought to be related to the social and cultural context.[7,8]

Reflexology is a very popular application among complementary health approaches.[9] Its history stretches back 12,000 years in ancient China and Egypt. Today, reflexology schools have been opened in European countries such as Britain, Belgium and France, and reflexology education is a training given in qualified schools in many countries for more than half a century.[10] Reflexology is a non-invasive, reliable, holistic complementary therapy method, which means that all glands, organs and all body parts are stimulated by applying a special pressure to the nerve endings in the hands, feet and ears.[11-13] The most common application area is the feet, since the points on the feet where the organs are reflected are wider and more prominent than the hands and ears, and they are more sensitive and sensitive than the hands.[11] By manually stimulating the nerves and blood circulation with reflexology, blood flow accelerates, lymphatic flow increases, endorphin release is encouraged to reduce pain and homeostasis improves.[12,14] Reflexology sessions, which are based on acupuncture basics and require special manual pressure techniques on reflex points, are applied for approximately 10-45 minutes. Session duration may vary according to symptoms and disease. 6-8 sessions are generally recommended by therapists to achieve optimal therapeutic results.[15,16]

The Traditional and Complementary Medicine Practices Regulation was established in 2014 by the Ministry of Health in Türkiye to determine the traditional and complementary medicine application methods for human health, to train and authorize the people who will apply these methods, and to regulate the working procedures and principles of the health institutions where these methods will be applied. Has been brought under control.[17] There are 15 practices under this regulation and reflexology is officially recognized as one of them.

In recent years, the diagnosis of quality of life has become increasingly important as an outcome measure both in research and epidemiological studies in the health field and in clinical applications. Quality of life is a difficult concept to define because it is a multifaceted concept, constantly developing and changing, being able to change from person to person, expressing what an individual enjoys in life, what he/she wants to be and how he/she wants to live, and being affected by social, psychological, economic and cultural factors. WHO defines quality of life as the way individuals perceive their situation in the context of the culture and value systems in which they live, in relation to their goals, expectations, standards and concerns.[18] In the literature, quality of life measures generally measure the pathological effects of current health status and are built on treatments related to health-related behavior and psychological states of individuals.[19] While there are general quality of life scales used in the measurement, there are also quality of life scales specific to a special condition such as menopause or specific to a disease.[20-23] Quality of life, which expresses the satisfaction of individuals with family community life and the well-being of physical and mental health, is a broad concept that includes being happy and content with life, and is affected by the person's physical health, psychological state, beliefs, social relations and relationship with the environment.[24] As can be understood from this explanation, quality of life, which may differ from culture to culture, may differ when measured in individuals from different cultures with the same physical health and psychological status. It has been reported that especially chronic diseases with long treatment processes and cancer significantly reduce the quality of life.[25-32] Studies evaluating the effectiveness of treatment, care and various interventions aimed at increasing the quality of life in such diseases are frequently encountered.

The effectiveness of reflexology in the management of many symptoms and diseases has been and continues to be investigated. Studies in the foreign literature have shown that reflexology has positive effects on fatigue, sleep problems, pain, premenstrual syndrome, cancer and chronic diseases, epilepsy treatment, constipation management

and palliative care, and found that it increases the quality of life.[33-45]

According to research, reflexology can create a positive outcome and improve quality of life in various diseases. However, strong evidence of its efficacy and safety is needed first for its health promotion and widespread use. To that end, systematic reviews or meta-analyses of randomized clinical trials (CTs) that are highly valuable in terms of evidence value should be performed. In our country, it is seen that the effects of reflexology are investigated in clinical studies and found in articles and theses.

The aim of this systematic review is to evaluate the CTs conducted in Türkiye examining the effect of reflexology on quality of life and to bring a conclusion with higher evidence value to the literature. The review questions are (a) How does reflexology affect people's quality of life? (b) In what circumstances does reflexology usage affect a person's quality of life? (c) What suggestions are there for more research?

MATERIAL AND METHODS

PROTOCOL

This study, which is a systematic review, was carried out using the PRISMA Statement (Checklist for Items Required in the Writing of the PRISMA Statement-Systematic Review or Meta-Analysis Research Report).[46]

ELIGIBILITY CRITERIA AND TYPES OF STUDIES

Experimental or intervention studies or CTs (randomized/non-randomized, control group/non-intervention studies) from studies conducted in Türkiye and published in Turkish and English in the literature were included in the study without time limit.

PARTICIPANTS

The research groups of studies in which the quality of life is measured with a standard method in healthy individuals or individuals with a special health condition or a disease in the adult and/or child age group consists of the participants of this study.

TYPES OF INTERVENTIONS

Studies in which the relationship between reflexology practices in the form of foot and/or hand massage as an intervention and quality of life were analyzed were included.

TYPES OF OUTCOME MEASURES

The results of valid and reliable measurement tools and/or health-related or specific disease-specific quality of life scales measuring individuals' perception of their own health, well-being, and improvement in disease symptoms/symptoms/signs were evaluated as "outcome criteria" in this review.

SEARCH STRATEGY

In this study, each step of the literature review, selection of articles, data extraction and evaluation of article quality was carried out independently by 2 researchers in order to minimize the risk of bias, and a consensus was achieved between these 2 researchers.

Scans, in Turkish and English, "reflexology", "quality of life", "Turkey"; it was carried out between November 2022-December 2022 using the keywords "reflexology", "quality of life" and "Turkey." In order to review this systematic review, publications in Türkiye published in Web of Science (SCI-Expanded, SSCI, AHCI), Science Direct, PubMed, Google Academic, ULAKBIM Medical Database and Journal Park, and theses accessed from the National Thesis Center, publications Studies in Turkish and English languages, the full text of which were available, which were conducted in an experimental type, reflexology application was performed, and the quality of life was measured with a standard method were included without time limit.

SELECTION OF STUDIES

The results of the screening are listed separately for each index, first of all, from the studies included in each list, other than the experimental study, published books, book chapters, compilations, meeting/proceedings, letters to the editor, observational studies and case series, etc. studies were excluded (Phase 1). Based on the described inclusion criteria, the remaining studies were titled and abstract reviewed separately by the authors, and studies that were not

relevant (not related to reflexology practice and/or did not include health-related quality of life measurement) were excluded (Phase 2). The lists containing the remaining records were combined and studies that were reflected in more than one index search results (repeated records) were excluded (Phase 3). The articles of the studies published both as a thesis and as an article were excluded from the evaluation and their theses were evaluated (Phase 4). At the end of the separation and selection phase, 16 studies that met the specified criteria were examined. The flow chart showing the selection process of the studies is shown in Figure 1.

DATA EXTRACTION

The Cochrane Data Collection Form was used as a guide and a "Data Extraction Form" was created to ensure that data were extracted from the included studies and correctly included all key findings in the review.[47] With this "Data Extraction Form", general information about the study (title, authors, year of study, type of publication (article/thesis), eligibility (type of study, inclusion criteria, participants, types of intervention, types of outcome measures, decision, reason for study exclusion), intervention and control (type, duration, frequency, intensity, comparator type, losses and follow-ups of reflexology practice),

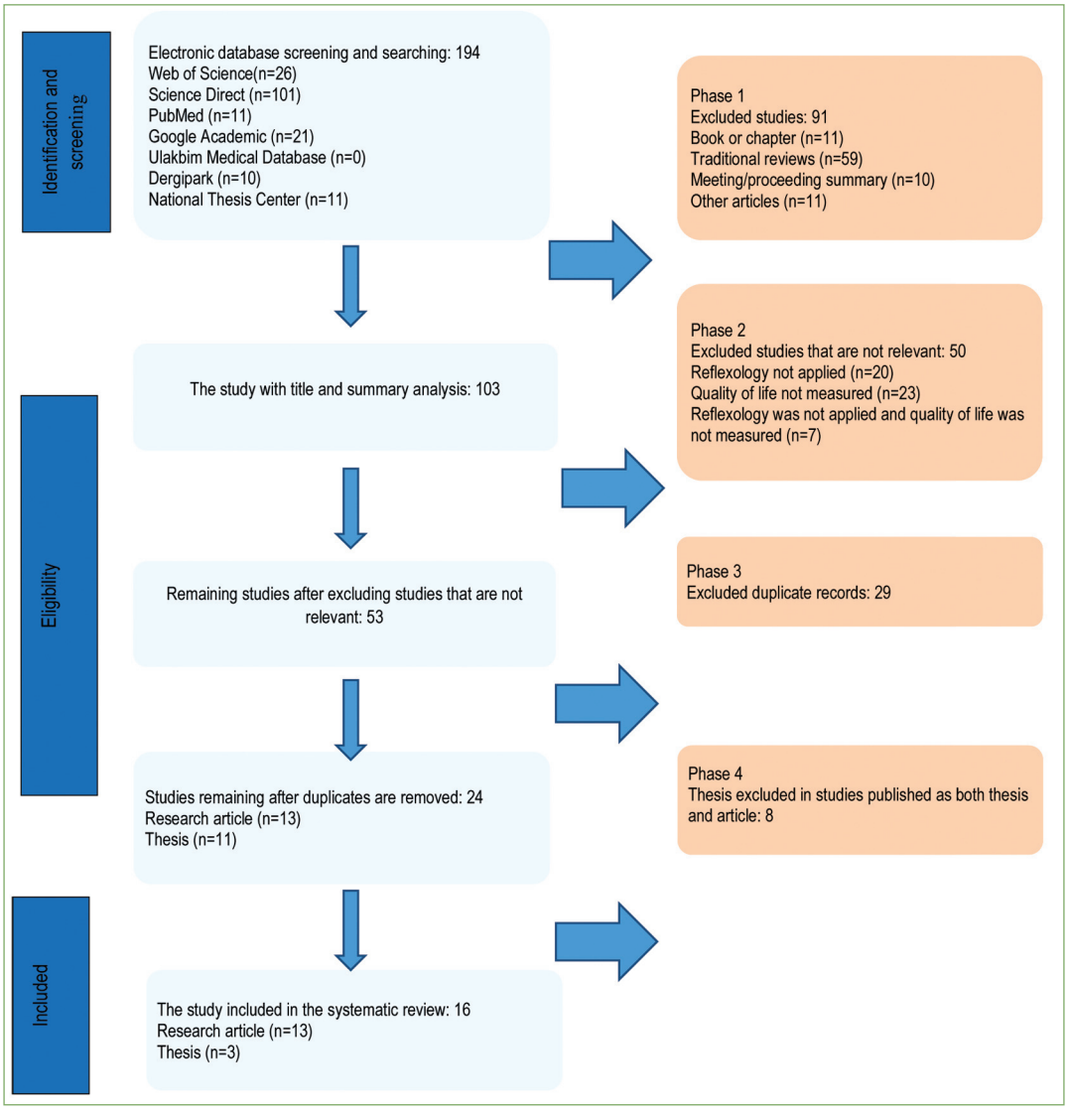

FIGURE 1: Flowchart showing the selection process of studies (PRISMA Flow Chart).

characteristics of participants (age, gender distribution, health/disease status, participation in a special group, number of samples and inclusion and exclusion criteria), bias prevention effort (presence of randomization, unawareness, blinding of participants, staff, outcome evaluation, missing outcome data, selective outcome and other biases), outcomes (health-related quality of life measurement tools and scores), and studies it was ensured that data about methodological quality evaluation scores were obtained.

One of the researchers extracted the data independently, and the second researcher evaluated the accuracy and consistency of all the collected data. In case of inconsistency, it was ensured that the 2 researchers reached a common decision. There was no study that could not be agreed upon.

STUDY QUALITY

Since experimental studies were included in the systematic review, the quality of the studies was evaluated using Critical Appraisal Skills Program-Quality Appraisal Criteria for RCT Evidence-(CASP).[48] CASP contains 11 items and it is evaluated as yes/no according to the condition of meeting the conditions in the items.

RESULTS

LITERATURE SEARCH

One hundred and 94 studies that meet all keywords in electronic databases [Web of Science (n=26); Science Direct (n=101); PubMed (n=11); Google Academic (n=21); Ulakbim Medical Database (n=0)]; Dergipark [(n= 10); National Thesis Center (n=11)] has been reached. Ninty one non-experimental studies [Book/book chapter (n=11); review (n=59); meeting/proceedings (n=10); other articles (n=11)] were excluded from evaluation, 103 of which 11 were dissertations. The abstract and titles of the study were examined in terms of relevance to the subject. A total of 50 studies in which reflexology was not applied (n=20), quality of life was not measured (n=23), and both reflexology was not applied and quality of life was not measured (n=7) were excluded as they were not relevant. Repeated records (n=29) in more than one database were excluded from 53 studies related to the subject. Full text published articles of both articles and theses (n=8) are left to be evaluated. Finally, only 13 research papers and 3 thesis met the inclusion criteria (Figure 1).[49-64]

THE CHARACTERISTICS OF THE LISTED STUDIES

The research under consideration were all published in 2011 or after. Sample sizes were minimum 15 and maximum 219. The intervention method used in all of them was foot reflexology. Two of the studies were performed in children under the age of 18, 2 in the elderly over the age of 65, and the others in adults between the ages of 18-65.[49-51-64] The characteristics of the included studies are shown in Table 1. Table 2 shows the impact of outcome measures on research findings.

THE POTENTIAL FOR BIAS OF THE LISTED STUDIES

Since 2 studies were performed as self-control and the randomization stages were adequately explained in 13 studies, the risk of bias in these studies is low.[49,54] However, there was some concern in one study that there was no explanation for randomization and that there might be bias due to lack of randomization.[60] Four studies were performed in a single-blind fashion.[55,56,61,62] Those excluded from these studies had a high risk of measuring outcome bias because they did not blind the outcome raters.

Except for four studies, other studies reported loss of outcome data due to loss of follow-up.[49,52,59,64] Outcome measure data of at least one and at most 20 people from the groups were not presented due to loss of follow-up.

Table 2 shows the evaluation results using CASP's CT type studies evaluation questions. Two trials met the least condition with 5 yeses.[49,57] Two trials met the highest condition with 9 yeses.[55,61] Confidence intervals (CIs) for comparisons of measures were not reported in any of the studies reviewed. Since none of them included a cost-effectiveness analysis, no comment could be made on which side of the intervention outweighed the harms and costs.

All of the research made their objectives very clear, and except for 5 studies, the other studies used a flow chart of the study to report their study pro-

TABLE 1: Characteristics of the studies considered in the systematic review.

			Participants				Intervention	
Ref.no	**Author(s), year**	**Study design**	**Groups (n) (loss to follow up)**	**Range of age**	**Sex (male/female)**	**Sypmtoms or disease**	**Frequency of reflexology**	**Comparison groups: Received treatment (duration)**
49	Güven, 2011	Self-controled CT; one group (blindness nonstated)	Reflexology: 219 Control: 219 (nonstated)	>18 years	Reflexology: 97/122 Control: 97/122	Patients with essential hypertension using ACE inhibitors or ARBs for at least 6 months	6 sessions in 6 weeks	Reflexology group: Foot reflexology (only left foot: 30 minutes) Self-controled group: No intervention
50	Gözüyeşil, 2014	RCT; 2 groups (blindness nonstated)	Reflexology: 58 (-6) Control: 62 (-5)	Aged 40-60 years	Reflexology: 0/58 Control: 0/62	Women in natural menopause with untreated hot flashes at least 3 times a day for 2 months	12 sessions in 6 weeks	Reflexology group: Foot reflexology (right foot: 5 min-left foot: 20-25 min) Control group: Classic foot massage (same frequency and duration as reflexology)
51	Alan, 2015	RCT; 4 groups (blindness nonstated)	Reflexology: 20 (-3) PMRE:2 0 (-5) Reflexology+PMRE: 20 (-1) Control: 20 (0)	>18 years	Reflexology: 0/20 PMRE: 0/20 Reflexology+PMRE: 0/20 Control: 0/20	Patients diagnosed with uterine, ovarian or cervical cancer between stage I-III, and who received the 2nd or 3rd cycle of chemotherapy, but did not receive radiotherapy	16 sessions in 8 weeks	Reflexology group: Foot reflexology (60 min.) PMRE Group: PMRE (same frequency as reflexology-40 min) Reflexology+PMRE: Foot reflexology (60 min)+PMRE (same frequency as reflexology- 40 min) Control group: No intervention
52	Sahiloğulları, 2015	RCT; 2 groups (blindness nonstated)	Reflexology: 20 Control: 20 (nonstated)	<18 years	Reflexology: 13/7 Control: 11/9	Children with spastic cerebral palsy	16 sessions in 8 weeks	Reflexology group: Foot reflexology (20-30 min) + Neuro-developmental therapy (45 min) Control group: Neuro-developmental therapy (45 min)
53	Doğan, 2015	RCT; 2 groups (blindness nonstated)	Reflexology: 30 (-3) Control: 30 (-7)	>18 years	Reflexology: 9/21 Control: 10/20	Multiple sclerosis patients diagnosed at least 6 months ago and not in an attack period	36 sessions in 12 weeks (40-50 min)	Reflexology group: Foot reflexology (45-50 min) Control group: No intervention
54	Aydın et al., 2016	Self controled CT; 1 group (blindness nonstated)	Reflexology: 50 (-13) (self control)	18-65 aged years	Reflexology: 0/50	Patients diagnosed with overactive bladder	12 sessions in 6 weeks	Reflexology group: Foot reflexology (45-60 min) Self-controled group: no intervention
55	Aydın & Aslan, 2016	RCT; 2 groups (single blind)	Reflexology: 50 (-9) Control: 50 (-7)	18-65 aged years	Reflexology: 0/50 Control: 0/50	Female patients diagnosed with overactive bladder	12 sessions in 6 weeks	Reflexology group: Foot reflexology (45-60 min) +medication+behavioral therapy (bladder training, pelvic floor muscle training, dietary adjustments) Control group: Medication+behavioral therapy (bladder training, pelvic floor muscle training, dietary adjustments)
56	Kurt, 2016	RCT; 2 groups (single blind)	Reflexology: 30 (-16) Control: 30 (-20)	>18 years	Reflexology: 16/14 Control: 16/14	Patients over 18 years of age who have been diagnosed with cancer, have received at least 4 cycles of chemotherapy, and have peripheral neuropathy grade ≥2 and ECOG Performance score ≤2	42 sessions in 3 weeks	Reflexology group: Foot reflexology (duration nonstated)+routine treatment Control: Routine treatment
57	Özkan, 2016	RCT; 3 groups (blindness nonstated)	Reflexology: 15 (-5) Placebo: 15 (-5) Control: 15 (-5)	Aged 2-18 years	Reflexology: 9/6 Plasebo: 8/7 Control: 8/7	Children with a diagnosis of spastic cerebral palsy who have not received botulinum toxin injections in the last 6 months	24 sessions in 24 weeks	Reflexology group: Foot reflexology (45 min) +routine treatment+physiotherapy Placebo group: Placebo reflexology (45 min) routine treatment+physiotherapy Control: Routine treatment+physiotherapy
			Groups (n) (loss to follow up)	Range of age	Sex (male/female)	Sypmtoms or disease	Frequency of reflexology	Comparison groups: Received treatment (duration)

CT: Computed tomography; ACE: Angiotensin converting enzyme; ARBs: Angiotensin receptor blockers; RCT: Randomised clinical trial; PMRE: Progressive muscle relaxation exercise.

TABLE 1: Characteristics of the studies considered in the systematic review *(continued)*.

			Participants				Intervention	
Ref.no	**Author(s), year**	**Study design**	**Groups (n) (loss to follow up)**	**Range of age**	**Sex (male/female)**	**Sypmtoms or disease**	**Frequency of reflexology**	**Comparison groups: Received treatment (duration)**
58	Uysal, 2016	RCT; 3 groups (blindness nonstated)	Reflexology: 20 (-1) Clasical masage: 20 (-2) Control: 20 (-2)	>18 years	Reflexology: 10/10 Classical masage: 8/12 Control: 12/8	Patients diagnosed with Stage II and III colorectal cancer who received postoperative or preoperative concomitant chemoradiotherapy treatment	10 sessions in 5 weeks	Reflexology group: Foot reflexology (right foot: 20 min-left foot: 10 min) Classical group: Classic foot massage (same frequency as reflexology) Control group: No intervention
59	Ödelikara & Tan, 2017	RCT; 2 groups (blindness nonstated)	Reflexology: 30 Control: 30 (nonstated)	>18 years	Reflexology: 0/30 Control: 0/30	Stage I-II-III breast cancer patients receiving ambulatory chemotherapy treatment	3 sessions with 3 chemotherapy cycles	Reflexology group: Foot reflexology (30-40 min) Control group: No intervention
60	Ateş, 2018	Non-RCT; 2 groups (blindness nonstated)	Reflexology: 27 (-3) Control: 28 (-2)	>18 years	Reflexology: 0/27 Control: 0/28	Patients diagnosed with subtype constipation-predominant irritable bowel syndrome	12 sessions in 6 weeks (duration nonstated)	Reflexology group: Foot reflexology (duration non stated) routine treatment+diet change Control group: Routine treatment+diet change
61	Dikmen & Terzioğlu, 2019	RCT; 4 groups (single blind)	Reflexology: 20 PMRE: 20 Reflexology+PMRE: 20 (-18) Control: 20 (-13)	>18 years	Reflexology: 0/20 PMRE: 0/20 Reflexology+PMR: 0/20 Control: 0/20	Patients with Stage 1-3 uterine, ovarian or cervical cancer receiving chemotherapy treatment	16 sessions in 8 weeks	Reflexology group: Foot reflexology (30 min) PMRE group: PMRE (same frequency and duration as reflexology) Reflexology+PMRE group: Foot reflexology (30 min)+PMRE (same frequency and duration as reflexology) Control group: No intervention
62	Türkçü, 2019	RCT; 2 groups (single blind)	Reflexology: 31 (-3) Control: 31 (-3)	>18 years	Reflexology: 0/31 Control: 0/31	Patients with a diagnosis of stage II/III cervix, endometrial or ovarian cancer who have received at least 1 chemotherapy	6 sessions in 2 weeks	Reflexology group: Foot reflexology (30-45 min) +standard nursing care Control group: Standard nursing care
63	İnkaya & Tüzer, 2020	RCT; 2 groups (blindness nonstated)	Reflexology: 30 (0) Control: 29 (-1)	>65 years	Reflexology: 13/17 Control: 15/14	With constipation for at least 6 months according to Rome IV criteria	3 sessions in 3 weeks	Reflexology group: Foot reflexology (30 min) Control group: No intervention
64	Aslan, 2021	RCT; 2 groups (blindness nonstated)	Reflexology: 34 Control: 34 (nonstated)	>65 years	Reflexology: 11/23 Control: 17/17	Patients with low back pain	6 sessions in 3 weeks	Reflexology group: Foot reflexology (30-40 minutes) Control group: No intervention

CT: Computed tomography; ACE: Angiotensin converting enzyme; ARBs: Angiotensin receptor blockers; RCT: Randomised clinical trial; PMRE: Progressive muscle relaxation exercise.

TABLE 2: The impact of outcome measures on research findings.

Ref.no	Author(s), year	Quality of life measurement	Key results	Advers effect	Significant effect on QoL	CASP
49	Güven, 2011	Short form (SF-36) health survey	In the study with the self-control group, the scores of all quality of life domains (except for the social function domain) increased after the intervention Areas of increase were physical function, physical role difficulty, pain, general health perception, virality, emotional role difficulty, mental health, physical summary score and mental summary score	None questioned	Yes	Yes: 5 No 4 Not clear: 2
50	Gözüyeşil, 2014	Menopause-specific Quality of Life questionnaire (MENQOL)	The 4 sub-dimensions of MENQOL before the intervention (vasomotor domain, psychosocial domain, physical domain and sexual domain) did not differ between groups The scores of the 4 sub-dimensions of MENQOL after the intervention were significantly different between the groups and were better (lower) in the experimental group than the control group Post-intervention within-group differences: In the control group, post-intervention scores improved (decreased) in the other 3 sub-dimensions, except for the sexual domain Post-intervention scores improved (decreased) significantly in all 4 sub-dimensions of MENQOL in the intervention group It has been reported that reflexology significantly improves women's psychosocial, physical and sexual quality of life	None questioned	Yes	Yes:7 No:2 Not clear:2
51	Alan, 2015	Multiple Sclerosis Quality of Life-54 (MSQOL-54)	There was no difference between the 4 groups before the intervention. After the intervention, there was a difference between the groups in the total quality of life scores at the 3rd, 8th and 12th weeks At week 3, the total quality of life scores of both the reflexology and reflexology+PMRE groups were significantly different and better (higher) than the control group At week 8, the total quality of life scores of the PMRE, reflexology, and reflexology+PMRE groups were significantly better (higher) than the control group At week 12, the total quality of life scores in the PMRE, reflexology, and reflexology+PMRE groups were significantly different and significantly better (higher) in the reflexology group than the PMRE group and in the reflexology+PMRE group than the reflexology group There is a significant difference between the groups in physical, psychological and social sub-dimension scores at the end of the 3rd, 8th and 12th weeks. The difference is due to the (poor) low scores of the control group The spiritual sub-dimension score is different at the 3rd and 8th weeks, and different at the 12th week, and this difference is due to the high score in the reflexology+PMRE group There was no in-group difference in the control and relaxation groups after the intervention There was a significant difference within the group in the reflexology and reflexology+PMRE groups after the intervention In the sub-dimensions reflexology and relaxation+reflexology groups, the physical sub-dimension scores of quality of life improved (increased) significantly at the 3rd, 8th and 12th weeks from the 1st interview	Questioned and no advers effects were reported.	Yes	Yes: 8 No: 2 Not clear: 1
52	Sahiloğulları, 2015	Childhood Health Assessment Questionnaire (CHAQ)	There was no difference between the groups in the 12 sub-dimensions of CHAQ before the intervention. After the intervention, there was a difference between the experimental and control groups in the sub-headings of general health perception, emotional effect on parents, family harmony. The scores in these sub-dimensions were better (higher) in the experimental group than in the control group After the intervention, there was no significant difference in the 12 sub-dimensions of CHAQ in the control group compared to before After the intervention, there was a significant difference in the sub-headings of general health, physical function, behavior, global behavior, mental health, self-esteem, general health perception, emotional effect on parents, time effect on parents, family harmony compared to pre-intervention and improved compared to pre-intervention. (increased). There was no difference in the sub-dimensions of pain and family activities	None questioned	Yes	Yes: 8 No: 2 Not clear: 1
53	Doğan, 2015	Multiple Sclerosis Quality of Life-54 (MSQOL-54)	There was no difference between the control and experimental groups before the intervention composite physical health and composite mental health and satisfaction with sexual function sub-dimensions. The change in health sub-dimension score was significantly higher in the experimental group than in the control group before the intervention The difference between the groups after the intervention: There was a significant difference between the groups in the sub-dimensions of composite physical health, composite mental health, change in health and satisfaction with sexual function in the 1st, 2nd and 3rd months of the intervention, and it was better (higher) in the experimental group than the control group Intra-group differences after the intervention: In the sub-dimension of composite physical health, change in health, and satisfaction with sexual function, no significant in-group change occurred in the control group during the study. The combined mental health sub-dimension score, on the other hand, significantly changed (decreased) in the control group at the end of the study compared to the baseline After the intervention, there was an improvement (increase) in the scores of all sub-dimensions in the experimental group, except for the item of satisfaction with sexual function	None questioned	Yes	Yes: 8 No: 2 Not clear: 1
54	Aydın et al., 2016	Overactive Bladder Questionnaire (OAB-V8) and Incontinence Impact Questionnaire (IIQ-7)	In the study with a self-control group, there was a significant difference in the MAP-V8 and IIQ-7 scores after the intervention compared to the pre-intervention, and the scores improved (decreased) compared to the pre-intervention	None questioned	Yes	Yes: 7 No: 3 Not clear: 1
55	Aydın & Aslan, 2016	Overactive Bladder Questionnaire (OAB-V8) and Incontinence Impact Questionnaire (IIQ-7)	There was no difference between the groups before the intervention MAP-V8 and IIQ-7 scores There was no difference between the groups in MAP-V8 and IIQ-7 scores after the intervention Both the experimental group and the control group showed improvement and a significant difference within the group after the intervention compared to before There are significant differences in mean scores of physical activity, traveling, social relationships, emotional health sub scales of IIQ-7 scale between first and last evaluation	None questioned	Yes	Yes: 9 No: 1 Not clear: 1

PMRE: Progressive muscle relaxation exercise.

TABLE 2: The impact of outcome measures on research findings *(continued)*.

Ref.no	Author(s), year	Quality of life measurement	Key results	Advers effect	Significant effect on QoL	CASP
56	Kurt, 2016	European Organization for the Research ve Treatment of Cancer Quality of Life Questionnaire Chemotherapy-Induced Peripheral Neuropathy (EORTC QLQ-CIPN 20)	Before the intervention, there was no difference between the groups in the sub-dimensions of sensory function, motor function and autonomic function There was no difference between the groups in motor function and autonomic function sub-dimensions after the intervention. There is a significant difference between the groups only in the sensory function sub-dimension, and the score of this sub-dimension in the experimental group is better (lower) than the control group Intra-group differences after the intervention: There were no significant differences in the 3 sub-dimensions in the control group Intra-group differences after the intervention: There was a significant difference in all 3 sub-dimensions in the experimental group compared to the pre-intervention and the sub-dimension scores improved (decreased) compared to the pre-intervention group	None questioned	Partially Yes (effective for sensory function only)	Yes: 8 No:1 Not clear:2
57	Özkan, 2016	Pediatric Quality of Life Inventory (PedsQL)	There is no difference between 3 groups in PedsQL children's total scale score before the intervention. There is a difference between the groups in PedsQL mother total scale score and it is worst (low) in the reflexology group before the intervention The difference between the groups after the intervention: PedsQL mother total scale score was significantly different between the groups after the intervention and the lowest in the reflexology group Intra-group differences after the intervention: There was no significant change in PedsQL child total scale score and PedsQL mother total scale score in the control group throughout the experiment Intra-group differences after the intervention: PedsQL children total scale score and PedsQL mother total scale score did not change significantly during the experiment in the experimental group and the placebo group	None questioned	No	Yes: 5 No: 4 Not clear: 2
58	Uysal, 2016	European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30) and EORTC QLQ-CR29	Prior to intervention, the 3 sub-dimensions of the EORTC QLQ-C30 (global health status, functional scale, and symptom scale) did not differ between the control, classical massage, and reflexology groups After the intervention (3rd and 5th weeks of the intervention), it was determined that there was a significant improvement in all 3 sub-dimensions in the experimental group compared to the control group (global health status, functional scale higher than the control group, symptom scale lower) No intra-group difference analysis was performed after the intervention	None questioned	Yes	Yes: 7 No: 2 Not clear: 1
59	Özdelikara & Tan, 2017	European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30)	It was not stated whether there was a difference between the groups before the intervention After the intervention, there was a significant difference between the groups in the sub-dimensions of general health score, function score and symptom score. General health score, function score is better (higher) in the experimental group than the control group, symptom score is also better (lower) Intra-group differences after the intervention: General health score, function score and symptom score sub-dimension scores improved significantly in the control group General health score, function score and symptom score sub-dimension scores improved significantly in the experimental group after the intervention	None questioned	Yes	Yes: 7 No: 2 Not clear: 2
60	Ateş, 2018	Irritable Bowel Syndrome Quality of Life (IBS QOL) Scale	Before the intervention, the IBS QOL scale score was not different between the experimental and control groups There is a difference between the groups after the intervention and the post-intervention IBS QOL scale score was significantly lower in the experimental group Intra-group differences after intervention-IBSQOL score decreased significantly in the control group compared to before after intervention Intra-group differences after the intervention-IBSQOL score decreased significantly in the experimental group compared to before after the intervention From the sub-dimensions of the IBS QOL scale in the control and experimental groups; median values decreased significantly in dysphoria, activity, body image, health anxiety and food avoidance sub-dimensions, but there was no significant difference in sexuality and social relationship sub-dimensions	None questioned	Yes	Yes: 5 No: 4 Not clear: 2
61	Alan Dikmen & Terzioğlu, 2019	Multidimensional Quality of Life Scaled Cancer (MQOLS-CA)	There was no difference between groups before the intervention After the intervention, there was a difference between the groups at the 3rd, 8th and 12th weeks There was no difference between the control and PMR groups after the intervention. A significant increase was found in the quality of life scores in the reflexology and reflexology+PMR groups. The highest score occurred at the 8th week of treatment No significant change in QOL was identified in the PMR group alone	Questioned and no advers effects were reported	Yes	Yes: 9 No: 1 Not clear: 1
62	Türkçü, 2019	European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Version 3.0 (EORTC QLQ-C30 v. 3.0)	Difference between groups before intervention: No difference in global quality-oflife, functional scales, symptomscales sub-dimensions of EORTC QLQ-C30 Difference between groups after intervention: Global quality-of life and functional scales score of EORTC QLQ-C30 was significantly different and higher in the experimental group than in the control group; symptom scales score is significantly different and lower in the experimental group than in the control group Differences within the group after the intervention: There was a significant increase in the global quality-of life and functional scales scores, and a significant decrease in the symptom scales scores in the experimental group compared to the pre-intervention group No within-group comparison was given in the control group	None questioned	Yes	Yes: 8 No: 1 Not clear: 2
63	İnkaya & Tüzer, 2020	Constipation Quality of Life Scale (CQLS)	There was no difference in the total CQLS score and sub-dimension scores between the groups before the intervention There is a difference between groups after the intervention and the CQLS total score in the experimental group is significantly better (lower) than the control group The scores of all sub-dimensions (physical discomfort, psychosocial discomfort, satisfaction, stool obstruction, worries) were significantly better (lower) in the experimental group than in the control group After the intervention, there was no difference in the CQLS total and five sub-dimensions scores in the control group compared to before. After the intervention, there was a significant difference in the CQLS total and five sub-dimensions scores in the experimental group compared to before, and they improved (decreased) compared to before	None questioned	Yes	Yes: 8 No: 2 Not clear: 1
64	Aslan, 2021	World Health Organization Quality of Life Instrument-Older Adults Module (WHOQOL-OLD)	There was no difference between the groups in the WHOQOL-OLD total score before and after the intervention Sensory abilities, autonomy and social participation subscores were different between the experimental and control groups before the intervention The sensory abilities subscore was significantly higher in the experimental group after the intervention, and the autonomy subscore was higher in the control group after the intervention. There was no difference between the groups in other sub-dimensions After the intervention compared to before; the WHOQOL-OLD total score increased significantly in both control and experimental groups Autonomy, past/present/future activities, and social participation sub-scores in the experimental group increased significantly after the intervention In the control group, the past/present/future activities and social participation sub-scores increased significantly after the intervention In the sensory abilities and dying/death sub-scale scores, there was no significant difference between the experimental and control groups after the intervention compared to before	None questioned	Yes	Yes: 7 No: 3 Not clear: 2

PMRE: Progressive muscle relaxation exercise.

cess.[49,52,54,59,60] Inclusion criteria were presented for all studies and outcome measures were reported.

STUDY FINDINGS

In the studies, different quality of life scales were used according to the characteristics of the research group to measure the quality of life. Except for one study, differences before the intervention between the groups were evaluated and reported in other studies.[59] In 2 studies, there were differences between groups before the intervention.[53,57] In all studies, the difference between the groups after the intervention was evaluated and the statistical significance level was reported with the p value. None of the research determined the effect size. In one study, it was concluded that reflexology intervention had no efficacy on quality of life, and in another study, it had no effect on other sub-dimensions of quality of life except sensory function.[56,57] Other 14 studies, it was reported that reflexology practice had a positive effect on quality of life.

DISCUSSION

This systematic review provides an insight into the results of studies on reflexology intervention in the Turkish population, its relationship to quality of life, and implications for practice.

The best evidence of treatment efficacy comes mainly from systematic reviews and meta-analyses of randomized controlled trials. Systematic reviews are at the top of the evidence pyramid.[65]

It enables practitioners to follow the evidence accumulated in the field and make evidence-based practice. Considering the abundance of resources in the field of health and the limited time of researchers, it is better understood how important systematic reviews play in decision making. It makes a large amount of information available by drawing meaningful and applicable conclusions from the seemingly complex and contradictory patterns of numerous studies, and by combining all available research on the subject in a single report. A good review is a unique resource that will contain all the available evidence for the research question of interest.

There is no doubt that the studies included in the review are of sufficient quality to be published according to the conditions of the period in which they were published. However, it is undeniable that they do not follow today's advanced guidelines and are not carried out with a specific study protocol or that they lack a standard reflexology methodology. Therefore, studies were of low quality and had risks of bias. The findings, however, demonstrate the enormous efforts made by Turkish experts to carry out high-quality study on reflexology and quality of life. The findings might serve as an example for researchers in our nation who are interested in reflexology. The validity of CTs is dependent on the randomization process. Randomization ensures that both the experimental and control groups show similar distributions in terms of predictable or undetectable factors. Because any situation that could possibly affect the experimental group will affect the control group in the same way.[66] In one of the studies examined, randomization was not performed while forming the research groups.[60] In this study, which was not randomized, it was stated that there was no difference between the groups before the intervention. In two studies reported differences between the groups before the intervention.[53,57] In one study, information was not provided about whether there was a difference between the groups before the intervention.[59] For this reason, it has been determined that there is a high risk in terms of taking sides in these studies.

Another important point is whether the follow-up period is long enough in clinical studies.[67] This review raises the question of how long it takes to improve quality of life in reflexology intervention. The longest follow-up period in the studies reviewed was 24 weeks and the shortest was 2 weeks. The fact that the follow-up periods are so variable creates doubts about the evidential value of the result. Another question that comes to mind is how much loss is relatively acceptable if the follow-up is not long enough or complete. The best way to understand this is to calculate whether the result of the study would change if all the patients who came out of follow-up and whose results were unknown had the opposite result of the study. In this case, it is accepted that the studies that cannot reach the result of more than 20% of the patients theoretically or lose from follow-up

are mathematically considered to have no chance against the worst-case scenario.[67] In the studies reviewed, it was observed that there were studies that did not report losses in follow-up, and there were studies that lost more than 20% from follow-up.[49,52,54,56,57,59,61,64] The evidence presented by these studies cannot be trusted in this situation either.

Loss to follow up bias is a common occurrence in studies requiring follow-up, such as CTs, due to dropout. In case of dropouts after randomization and incomplete outcome data, results may be interpreted differently than they actually are. For this reason, it is recommended to use "intention to treat" (ITT) in such cases.[68] The findings were analyzed and interpreted on the participants who continued the research. ITT was not performed in any of the studies reported to have individuals unable to complete the CT. Analyzing the patients within the randomized group is one of the sine qua non to reduce the bias. Patients who dropped out of the study for any reason should be treated as if they had received treatment in the group they were randomized to. Even patients in the placebo group need to be evaluated. Because even they have been repeatedly shown to have consistently different outcomes than others. In such cases, it is extremely important that they are analyzed in the group they are randomized to, that is, ITT analysis, in order to maintain the prognostic balance.[69]

If the randomization is done successfully, we can say that the treatment and control groups have the same prognosis when they enter the study. Whether these 2 groups will continue in the same prognostic balance is only possible if the study is blinded. Blinding is the most important step in maintaining the prognostic balance. One of the important problems identified in the studies reviewed was the lack of use of blinding and therefore the risk of outcome bias. Blinding is an empirical process used in randomized CTs to reduce observational bias. Blinding helps deter well-documented research events that introduce observational bias into randomized controlled trials, such as the Hawthorne effect, the Halo effect, treatment diffusion, compensatory competition, and biased statistical analysis. Therefore, the use of blinding strengthens the internal validity of a randomized controlled trial.[70]

Only four studieswere conducted in a single-blind fashion, with no discernment efforts made outside of these studies.[55,56,61,62] For this reason, it can be thought that the results of unblinded studies may have been affected by the attitudes of the researchers and there is a high risk of taking sides. Reflexology positively affected quality of life in 3 of the four blinded studies.[55,61,62] In one, reflexology positively affected the quality of life only for sensory function, while it was found to be ineffective in other areas.[56] Multiple blinding should be used to distinguish the effects of reflexology on quality of life from placebo effects and to avoid performance and determination bias.

In none of the studies examined, the effect size was estimated. All results were interpreted through hypothesis tests and p values. Whereas, statistical significance (p-value) is the probability that the observed difference between the 2 groups is due to chance. A statistically significant result may sometimes only have arisen from using a large sample. Statistical significance depends on both sample size and effect size, and effect size is usually independent of sample size. Therefore, simply reporting the p-value as an analysis result is not sufficient for readers to fully understand the results.[71] Effect size is an easy way to measure the effectiveness of a particular intervention and provides a more scientific approach to the magnitude of an intervention or its effectiveness rather than statistical significance. For these reasons, it is an important tool for reporting and interpreting the event.[72]

In one of the studies, reflexology intervention did not cause a significant change in quality of life, that is, it was ineffective; in one, it was reported to be partially effective (only for sensory function).[56,57] In all of the remaining 14 studies (although there was no significant difference in some sub-dimensions), it was concluded that reflexology practice had a positive effect on the quality of life in general. There is a suspicion that there is a risk of selective outcome reporting bias, due to insufficient analysis when comparing the effectiveness of the intervention, lack of a standard analysis plan, and failure to look at the pre-intervention and post-intervention differences in some studies. Using an approved checklist in the

studies to be done can provide an unbiased approach in reporting and eliminate the bias that may occur.

The fact that the research groups were selected from different disease and/or symptom groups, patients at different stages of the same disease, or patients in different treatment periods in the studies and the use of different quality of life assessment/measurement tools make it difficult to generalize and interpret the results. In addition, it was observed that the side effects of the intervention were not questioned in the studies (except for 2 studies), and a standard evaluation method was not used in the studies that were questioned.[51,61] In future studies, any adverse effects of reflexology practice should be determined and reported in a standard way.

Reflexology is a non-invasive, holistic approach and complementary therapy with no side effects.[73-75] Reflexology can be a useful intervention in improving quality of life in terms of effectiveness and ease of application. It may also be appropriate because it is more cost-effective than other medical treatments. However, evidence is needed to demonstrate this in terms of cost effectiveness. However, no evaluation was made in terms of cost effectiveness in any of the studies examined. It has not been evaluated whether it can be used as a replacement for an existing practice, its resource requirements in terms of cost effectiveness, finance and skills development or training, or whether it is an effective response tool. It would be appropriate for future studies to include an evaluation in terms of cost-effectiveness and applicability from this perspective.

In clinical studies, the dose of the intervention is also an important parameter. Although all of the reflexology interventions were foot reflexology in the studies examined, it was seen that the frequency, duration, application of one or both feet and the techniques used differ from study to study. This situation raises questions about what kind of intervention can be effective when applied where, when and how often.

STRENGTHS AND LIMITATIONS

The most important limitation of this systematic review is that only studies conducted in Türkiye are included. More studies would have been reviewed if studies from other countries and regions were included. However, such an evaluation was made considering that the quality of life is affected by cultural differences. Most of the included studies were not blinded. This may have caused bias regarding the results. In addition, the fact that the difference between the groups was evaluated only with hypothesis tests and p value, and the ESs were not given, caused insufficiency in evaluating the real effect level. One of the key strengths of this review is that it is a review of CTs. Its main strength is that it examines the impact of reflexology on quality of life.

IMPLICATIONS FOR PRACTICE

In terms of study protocol, more clear evidence should be presented with quality studies and effect size calculation. Multiple blinded (practitioner, participant, outcome evaluator for outcome measurement reliability, statistician) studies are required in which unawareness is provided. Modeling studies that incorporate and detailed attempts to mitigate the potential of bias should be used to design future investigations. This evaluation highlights the need for more high-quality CTs performed utilizing study procedures.

CONCLUSION

Reflexology, low back pain, irritable bowel syndrome, constipation in those with complaints, menopause, cancer (cervix, endometrial or ovarian, colorectal cancer) and during cancer treatment, in multiple sclerosis, in women with overactive bladder and spastic cerebral palsy may reduce symptoms and improve quality of life in children. The lack of research with a low risk of bias prohibits any concrete recommendations from being made, despite the fact that it is an effective technique. Despite being a useful and safe intervention, quality CTs assessing the effectiveness of reflexology in improving quality of life provide less evidence than expected. Furthermore, studies do not allow for a pooled estimate of the resulting effects for further interpretation and analysis, as studies generate heterogeneity with different measures of quality of life in different diseases and symptoms. Finally, future research should concentrate on enhancing study quality by taking into ac-

count the quality-related criteria discussed in this article.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Ersin Uskun;* ***Design:*** *Ersin Uskun;* ***Control/Supervision:*** *Ersin Uskun, Mürüvet Çırak;* ***Data Collection and/or Processing:*** *Ersin Uskun, Mürüvet Çırak;* ***Analysis and/or Interpretation:*** *Ersin Uskun;* ***Literature Review:*** *Ersin Uskun, Mürüvet Çırak;* ***Writing the Article:*** *Ersin Uskun, Mürüvet Çırak;* ***Critical Review:*** *Ersin Uskun, Mürüvet Çırak;* ***References and Fundings:*** *Ersin Uskun, Mürüvet Çırak;* ***Materials:*** *Ersin Uskun.*

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