

An Overview of Systematic Reviews and Meta-analyses on Diabetic Neuropathy: A Quantitative Cross-Sectional Analysis

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Abstract

Background: Evidence informed practice relied upon evidence from systematic reviews and meta-analyses as the highest in the hierarchy in order to inform clinical practice decisions in foot and ankle rehabilitation in people with Diabetic peripheral neuropathic pain (DPNP) and Painful diabetic peripheral neuropathy (PDPN). **Purpose:** This study aimed to perform a systematic review and quantitative content analysis of systematic reviews on DPNP and PDPN. **Materials and Methods:** The extracted data about every included study included: journal, year of publication, number of authors, country of manuscript origin, goal of article (evaluation or intervention or both), subtypes of intervention (medical, surgical, or allied health), population characteristics (homogeneous or heterogeneous), and professional dimension. **Results:** There were 36 systematic reviews found, most of which were published from developed countries, in many scientific journals across the past 15 years, with lesser number of authors, with search strategy that utilized limited number of databases, included few studies, and they were predominantly on medical interventions.

Conclusion: The few systematic reviews and meta-analyses on DPNP and PDPN provided evidence information for decision making towards evaluation and management of foot and ankle dysfunction in this population.

Key words: Evidence-based diabetes care; Diabetic peripheral neuropathic pain; Foot and ankle dysfunction; Painful diabetic peripheral neuropathy.

Introduction

Clinical research on foot and ankle is evolving through a phase of ongoing paradigm shift towards evidence-informed practice (EIP) where individualized therapy prescription in evaluation and management was to be given with a shared self-reflective clinical reasoning-based decision making considering client preferences and findings from current scientific research evidence.[1-4]

EIP relied upon evidence from systematic reviews and meta-analysis of randomized controlled trials as the highest in the hierarchy in order to inform clinical practice

decisions in foot and ankle rehabilitation (FAR).[5] Analysis of reporting status for systematic reviews provides valuable information on status of peak of evidence pyramid necessary for facilitation of policy making in the area under focus.[6]

One of the common complications of the global epidemic of diabetes mellitus is the Diabetic peripheral neuropathy (DPN) which manifests as lower extremity peripheral nerve dysfunction affecting the foot and ankle.[7] Hence there is need to evaluate

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systematic reviews on DPN so that EIP in FAR could be effectively implemented. The objective of this paper was to perform a quantitative explorative overview of systematic reviews and meta-analyses on DPN.

Materials and Methods

Study Design

Descriptive systematic overview

Search methods

Two independent reviewers performed literature search, extracted data according to a pre-decided checklist and performed data synthesis with an ongoing mutual consensus for disagreements at every stage of the review process.

Search Strategy

The search terms “(neuropathy[Title] OR neuropathic [Title]) AND (diabetes [Title] OR diabetic[Title])” were used through advanced search feature[8] of PubMed database with search filters[9] activated for Systematic Reviews, Abstract available, and English language publications.

Data Extraction and Synthesis

The obtained articles were considered as systematic review if they fulfilled four criteria: specified criteria for inclusion of studies, specific search strategy mentioning databases, reporting results by mentioning number of included studies, with or without meta-analysis.

The selected reviews were grouped and sugrouped as follows: country of publication, year of publication, number of authors, goal of study, professional dimension, type of population, number of databases, and number of included

studies. A similar approach to data synthesis was previously used by Kumar *et al.*[10]

Results: Main Findings

The initial list of 73 articles was scrutinized and a final list of 36 articles[11-46] was included for data extraction and synthesis. The 37 excluded articles were either not systematic reviews (N=28) or they were not on diabetic neuropathy (N=9).

Journals

A total of 30 journals published the 36 systematic reviews and amongst them, ANT had one article[41], AP had one article[35], BMCN had two articles[33,37], BMJ had one article[40], CDSR had 4 articles[14,21,38,43], CJP had one article[16], CMRO had one article[23], DC had two articles[68,72], DFA had one article[15], DM had one article[45], DRCP had two articles[18,24], EJE had one article[12], EODS had one article[25], FK had one article[20], IJE had one article[17], JAMA had one article[31], JDC had one article[31], JE had one article[11], JFAS had one article[30], JGIM had one article[34], JGPT had one article[19], JPSM had one article[42], JRM had one article[26], JVS had one article[32], NJM had one article[28], P had one article[22], PM had one article[39], PO had one article[13], RAPM had one article[36] and SMW had one article[27] (Figure 1).

Years of Publication

The systematic reviews were published from 1996[45,46] onwards to 1999[44], 2000[42,43], 2005[41], 2007[39,40], 2008[35-38], 2009[30-34], 2010[23-29], 2011[19-22] until 2012[11-18] (Figure 2).

Figure 1: Comparison of Number of Articles between Journals

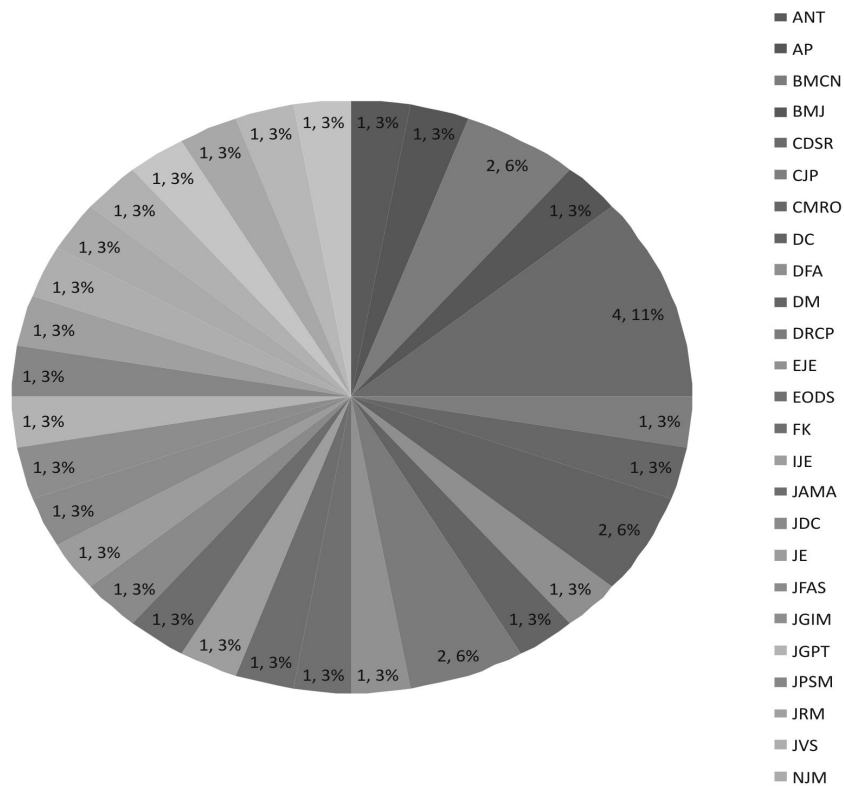
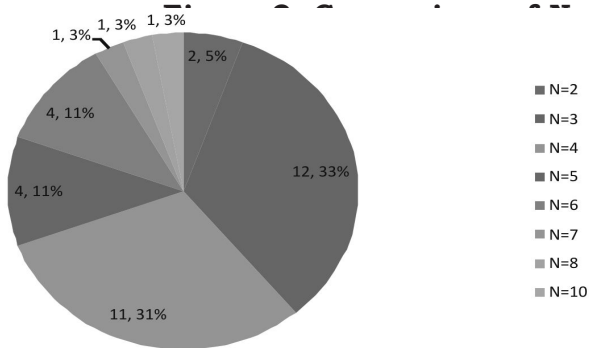


Figure 3: Comparison of Number of Articles between Number of Authors per Article



Number of Authors per Article

There was no consistent pattern for number of authors per article found for the systematic reviews, with two authors[15,30], three authors[18,20,21,23,26,32,34,35,40,41,44], four authors [11,12,14,16,24,28,29,31,37,42,43], five authors[17,22,27,36], six authors[19,25,

39,46], seven authors[13], eight authors[33] and ten authors[45] (Figure 3).

Nationality of Corresponding Author

The corresponding authors for reviews were from 10 countries, and Austria had one article[26], Canada had one article[29], China had 6 articles[11-

Figure 4: Comparison of Number of Articles between Countries

Figure 7: Comparison of Number of Articles between Interventions

Figure 5: Comparison of Number of Articles between Goals of Study

Figure 8: Comparison of Number of Articles Between study Population

Figure 6: Comparison of Number of Articles between Professional Dimensions of Study

Figure 9: Comparison of Number of Articles between Articles with/without Meta-analysis

13,20,21,24], Germany had two articles[16,22], Hong Kong had one article[40], Italy had two articles[45,46], Netherlands had two articles[17,28], Taiwan had one article[41], UK had seven articles[18,27,31,33,37,42,43], and USA had 13

Figure-10: Comparison of Number of Articles between Number of Searched Databases

articles[14,15,19,23,25,30,32,34-36,38,39,44] (Figure 4).

Goal of Study

32 studies had intervention[11-17,19-28,30,31,33-46] had their goal, and 3 were on evaluation[18,29,32], with only one study on both[39] (Figure 5).

Professional Dimension of Study

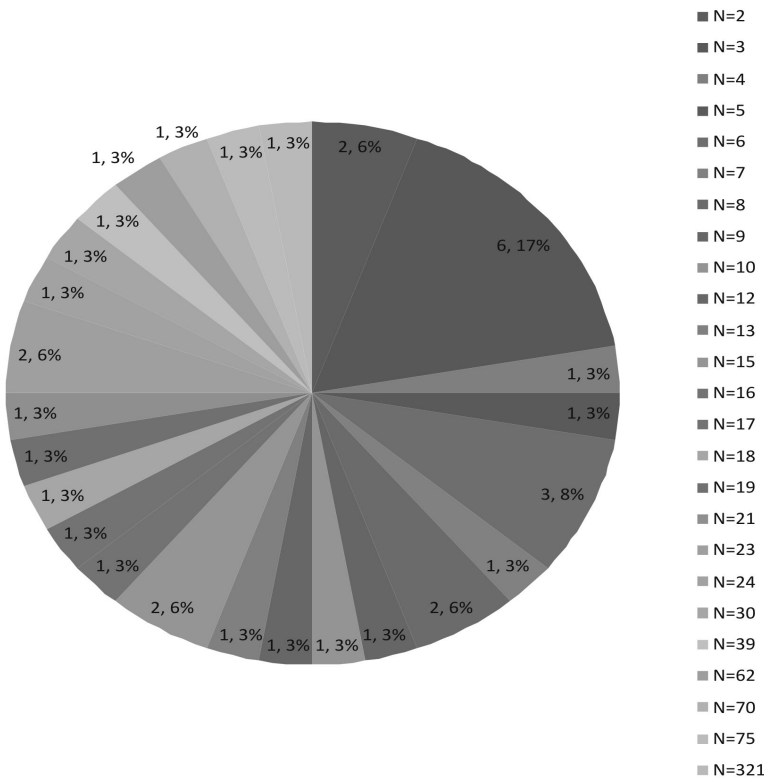
32 studies were on practice[11,12,14,15,17-21,23-38,40-46], 3 studies were on research[13,16,22] and one was on mixed[39] (Figure 6).

Type of Intervention

Of the 33 studies on intervention, 20 were on medical[12,14,16,17,22,23,25,27,28,33-37,42-46], 4 each on allied health[19,24,26,31] and complementary [11,13,20,21], 3 on surgical treatment [15,30,38] and 2 on multidisciplinary intervention[39,40] (Figure 7).

Type of Population

30 studies were homogeneous[11-15,17-21,24-33,35,36,38-41,43-46] and 6 were heterogeneous[16,22,23,34,37,42] (Figure 8).



Articles between Numbers of Included Databases

Presence/ Absence of Meta-analysis:

22 studies had meta-analysis[11,12,14-17,22,24,25,27,29,32-34,36,37,40,42-46] and 14 studies did not[13,18,19,20,21,23,26,28,30,31,35,38,39,41] (Figure 9).

Number of Databases Searched

The studies included search strategies that comprised of searching 1 to 9 databases, with articles utilizing search strategy using 1 database[15,25,26,32,35,39,43,44], 2 databases[17,23,28,29,30,31,34,36,45,46], 3 databases[14,24,33,37,41], 4 databases [12,16,18,19,40,42], 5 databases[22], 6 databases[11,27,38], seven databases[20], eight databases[13] and nine databases[21] (Figure 10).

Number of Included Studies

There was a huge range of 2[30,35] to 321[39] studies included in the reviews, with a greatest number of 6 studies [18,24,25,34,36,46] that included 3 trials each (Figure 11).

Discussion

This study aimed to provide an explorative overview of systematic reviews and meta-analyses on DPN and it found that limited number of reviews existed, which were published from developed countries, in many scientific journals across the past 15 years, with lesser number of authors, with search strategy that utilized limited number of databases, included few studies, and they were predominantly on medical interventions.

Overall limited number of systematic reviews warrants training and skill

development for researchers on search strategy and appraisal and meta-analysis software and techniques in order to improve conduct and reporting by authors and changes in publication policies by editors.[47]

The emerging role of China in its third leading position in number of systematic reviews on DPN is a positive trend for a developing country which indicated accessibility to original research through online subscription to scientific databases.[48]

Medical interventions for DPN are the mainstay in management of patients be it aetiopathogenetic, symptomatic or palliative.[49-51] There is scope for systematic reviews on surgical[52], physiotherapeutic[53] and neurodynamic interventions[54] in the future. The larger number of systematic reviews on medical interventions may be due to presence of many RCTs[55] and funding opportunities for industry-sponsored clinical trials from drug developers and companies.[56]

Few acceptable limitations of this study were inclusion of PubMed database for search since it was the widely accessed comprehensive biomedical evidence resource[57]; and use of search filter option instead of subject category of systematic reviews for finding the articles which was due to relatively recent introduction of the latter option in PubMed.[58]

There is need for future analyses of randomized controlled trials to further explore the underlying evidence information so that a more appropriate extrapolation could be made to suit specific patient types of foot and ankle dysfunction in DPN.

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