

Epidemiological Characteristics of Traumatic Spinal Cord Injury (TSCI) in the Middle-East and North-Africa (MENA) Region: A Systematic Review and Meta-Analysis

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ABSTRACT

Objective: To systematically search the literature and to summarize current evidence pertaining to the epidemiology of SCI in the MENA region incidence, gender, age, type of the injury and etiology of the injury. **Methods:** Embase, PubMed, Scopus, Web of Science and EBSCOhost were systematically searched from their dates of inception till July 2017 for English and non-English language articles. Also, regional databases were searched. Data were extracted from eligible articles and pooled under the random effect model using *R*. References of the included articles were also screened for potentially relevant studies.

Results: We identified 29 articles from seven countries in the MENA region (Turkey, Iran, Saudi Arabia, Egypt, Jordan, Kuwait and Qatar). The mean age of the cases at time of injury was 31.32 (95% CI: 28.74-33.91). The random pooled annual incidence of TSCI per million was 23.24 (95% CI: 5.64-49.21). Pooled proportion of male gender was 77% (95% CI 73-80%) of the cases. Complete paraplegia was the most common type of injury. Thoracic level injury predominated. Also, the most commonly affected age group was 20-29 then 30-39. Motor vehicle accidents were found to be the leading cause of injury, then falls, gunshot, violence and sports. Further meta-regression analysis showed no association between age and etiology of the injury.

Conclusion: This review shows lack of evidence about SCI in most countries of the MENA region. More epidemiological studies are needed.

Keywords: Spinal cord injury; Epidemiology; Incidence; Middle-east; North-Africa; Etiology; SCI.

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Introduction

C pinal cord injury (SCI) is one of the most devastating events in which lesions to the spinal cord cause motor impairments, sensory deficit, or autonomic nervous system dysfunction [1]. The incidence of traumatic spinal cord injury (TSCI) in the developing countries was 25.5/million/year [2]. People with SCI are 2 to 5 times to die prematurely than people without SCI, depending on the health-care system capacity [3]. Moreover, SCI is associated with various economic, psychological and social impacts. For example, in 2008, the total cost of SCI in Australia was estimated to AUS\$ 2 billion with life-time cost of AUS\$ 5 million per case of paraplegia and AUS\$ 9.5 million per case of tetraplegia [4]. With the limited resources in low-income countries, healthcare cost is one of the main barriers affecting the quality of life of people with SCI [5]. Furthermore, clinical symptoms of depression were seen in 20-30% of people with SCI [6]. Because there is no cure for SCI, primary and secondary prevention strategies are vital [7]. Epidemiological evidence will help to plan and implement future preventive measures. Although more than 436 million live in the Middle-East and North-Africa (MENA) region, epidemiological patterns of SCI in the region are not well characterized [8].

This review aims to summarize current evidence pertaining to SCI in the MENA region regarding the incidence, age, gender, etiology and type of injury.

Materials and Methods

Guidelines

We followed the Meta-analysis of observational studies in epidemiology (MOOSE) Statement in reporting this meta-analysis [9].

Search Strategy

One of the authors (Elshahidi) designed and conducted the search process. The search process was performed using a comprehensive list of keywords (list of keywords and details from each database search can be found in the 'supplementary materials: Search Strategy'). No language nor publication period restrictions were applied.

Data Sources

An electronic search on Embase, PubMed, Scopus, Web of Science and EBSCOhost databases was conducted from their dates of inception till July 2017. In addition, other regional databases including the Index Medicus for the Eastern Mediterranean Region (IMEMR) and African Index Medicus were searched. Also, references of included articles were handsearched for relevant records. Also, some previously published systematic reviews were searched for relevant articles.

Criteria for Selecting Studies

Two authors independently screened retrieved records in two steps: title and abstract screening then full-text reviewing. They applied the inclusion and exclusion criteria to select relevant articles (Table 1). Our definition of the Middle-East and North-Africa (MENA) region is based on The World Bank definition (See 'supplementary materials: Search Strategy' for list of the included countries) [10]. Any conflict was resolved by discussion.

Data Extraction

Two authors independently extracted data using a data collection form prepared by the team. The extracted data included: study reference, sample size, country, duration of the study, male/female ratio, incidence, age, type of the study, type of the injury and etiology of the injury. Any disagreement was resolved by discussion.

Data Analysis

SCI epidemiological characteristics were presented as percentages that were pooled with 95% confidence interval (CI) using the 'meta' package, R 3.4.0 [11]. We used Cochran-Q test to identify heterogeneity, and I-square test was used to quantify its extent. When significant heterogeneity was found (p<0.1), the random-effect model was used [12]. A subgroup group analysis by country was applied. Moreover, a metaregression model was used to assess the association between etiology of injury and male gender and age.

Quality Assessment

A modified version of The Newcastle-Ottawa Scale (NOS) for assessing the quality of non-randomized studies in meta-analyses was used to assess quality of the included studies [13]. Each study could attain a maximum of four points. Studies with \geq 3 points were considered of good quality. Those with \leq 2 points were considered of poor quality. The scale rated the papers according to: 1) inclusion and exclusion

 Table 1. Summary of inclusion and exclusion criteria

| Table 1. Summ | ary of inclusion and exclusion criteria | |
|---------------|---|--|
| Criteria | Inclusion | Exclusion |
| Study | Any study published in any year, language or setting | Reviews, editorial, basic science studies, animal studies, |
| | about SCI in the MENA region | case studies or studies out of the MENA region |
| Design | Cross sectional, Retrospective, Prospective | drug trials |
| Observation | Epidemiological characteristics of spinal cord injury; incidence, age, type of injury, etiology of injury | Specific etiological focus, unrelated specific topics (depression, sleep disorder, pain, pressure ulcer, morbidity or other secondary complications), mixed data without |
| | | independent report of SCI data, spine injuries. |

criteria were clearly stated 2) data came from a secure source (register, administrative database or prospectively collected) 3) detailed reporting of analyses results (95% CI or standard error).

Results

Study Selection

Our comprehensive search retrieved 21 557 references. After abstract and full-text reviewing, 29 articles met our inclusion criteria. The included studies were conducted in seven MENA countries (Figure 1). A summary of the included studies was provided in Tables 2, 3 and 4 [14-42]. The number of cases ranged from 1694 [30] to 4 [35].

Mean Age

The mean age ranged from 41.3 in Turkey [28] to 20.6 in Kuwait [38]. The random pooled estimate of mean age was 31.32 (95% CI: 28.74-33.91) (Figure 2).

Male Gender

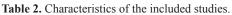
27 studies showed high proportion of males than females. The other two studies showed equal proportion of males to females [25, 35]. The random pooled estimate of male proportion across the included studies was 77% (95% CI: 73-80%) (Figure 3).

Incidence

The incidence of SCI ranged from 7.8/million/year in Kuwait [38] to 72.45/million/year in Iran [16]. The pooled estimate of the annual incidence of SCI across studies was 23.24 per million (Figure 4).

Completeness of the Injury

The random pooled estimate for complete paraplegia was 44% (95% CI: 37-53%) (Figure 5). Whereas, complete tetraplegia pooled estimate was 20% (95% CI: 15-27%) (Figure 5).



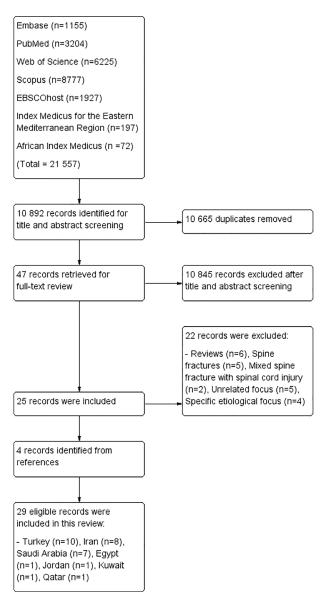


Fig. 1. A flow chart of the search process, performed in July, 2017.

| Study ID (Reference) | Duration of the study | Country | Sample size | Mean age(SD) | Male (%) | M/F ratio | Incidence (per million) | Prevalence | Type of the study |
|--|----------------------------------|-----------------|----------------|------------------|-----------------|--------------|-------------------------------|----------------------|---|
| Al-Jadid <i>et al.</i> , [14] | January 2005-October 2008 | Saudi Arabia | 495 | 34.3 (±0.68) | 404 (81.6%) | 4.44 | - | - | Retrospective review of admission records |
| Al-Jadid <i>et al.</i> , [15] | August 1982-November 2010 | Saudi Arabia | 466 | 29.75 (±0.73) | 398 (85.4%) | 5.85 | - | - | Retrospective review of hospital records |
| Rahimi-Movaghar <i>et al.</i> , [16] | June 2007-June 2008 | Iran | 496 | - | 342 (68.95%) | 2.22 | 72.45 | 4.4 (per 10 000) | Population-based |
| Al-Habib <i>et al.</i> , [17] | May 2001-May 2009 | Saudi Arabia | 23 | 13.7 (±4.5) | 17 (74%) | 2.83 | - | - | Retrospective study |
| Tasoglu et al., [18] | June 2013- May 2014 | Turkey | 262 | 38.3 (±17.6) | 183 (69.8%) | 2.32 | 8–21 | - | Retrospective |
| Derakhshanrad <i>et</i> <i>al.</i> , [19] | September 2011- March 2015 | Iran | 1137 | 29.1 (±11.2) | 901 (79.2%) | 3.82 | - | 2.36 (per 10 000) | Cross-sectional study |

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|---|---------------------------------------|-----------------|------|--------------------|------------------|------|-------|---------------------|--|
| Gur <i>et al.</i> , [20] | 1990-1999 | Turkey | 539 | 30.62 (± 13.21) | 416 (77.17%) | 3.38 | 12.06 | - | Retrospective review of hospital records |
| Erhan <i>et al.</i> , [21] | January 1992 - December 2002. | Turkey | 106 | 12.67 (± 4.3) | 70 (66%) | 1.94 | - | - | Retrospective study |
| Erdoğan <i>et al.</i> , [22] | January 2007 - December 2011 | Turkey | 409 | 46.82 (±19.05) | 253 (61.9%) | 1.62 | - | - | Descriptive study |
| Mahmoud <i>et al.</i> , [23] | 2009 - 2014 | Saudi Arabia | 418 | 31.4 | 244 (78.2%) | 3.59 | - | - | Retrospective cohort study |
| Karamehmetoglul <i>et al.</i> , [24] | January 1992 - 31 December 1992 | Turkey | 152 | 32.5 | 114 (75%) | 3.00 | 21 | - | Retrospective study in all hospitals of Istanbul |
| Alfrayh et al., [25] | August 1982 - November 1983 | Saudi Arabia | 260 | - | 130 (50%) | 1.00 | - | - | Hospital-based study |
| El Tallawy <i>et al.</i> , [26] | July 2009 - January 2012 | Egypt | 6 | 40 (±16) | 5 (83.33%) | 5.00 | - | 18 (per 100 000) | Cross-sectional study |
| Movaghar <i>et al.</i> , [27] | January 2003- January 2008 | Iran | - | 31 (±7) | - | - | - | 4.4 (per 10 000) | Cross-sectional study |
| Atci <i>et al.</i> , [28] | 2010-2013 | Turkey | 91 | 41.3 | 64 (70.4%) | 2.37 | - | - | Retrospective review of the emergency department records |
| Karamehmetoglul et al., [29] | January 1994- December 1994 | Turkey | 75 | 31.3 | 64 (85.33%) | 5.82 | 16.9 | - | Retrospective study |
| Dincer <i>et al.</i> , [30] | 1974-1985 | Turkey | 1694 | 26.8 | 1282 (75.68%) | 3.11 | - | - | Retrospective study |
| Karacan <i>et al.</i> , [31] | January 1992 - December 1992 | Turkey | 581 | 35.5 (±15.1) | 415 (71.42%) | 2.50 | 12.7 | - | Retrospective study |
| Alshahri <i>et al.</i> , [32] | January 2003 - December 2008 | Saudi Arabia | 307 | 29.5 | 271 (88%) | 7.53 | - | - | Retrospective study |
| Cosar <i>et al.</i> , [33] | 1996 - 2008 | Turkey | 127 | 37.8 (±13.651) | 86 (67.7%) | 2.10 | - | - | Retrospective study |
| Taghippor <i>et al.</i> , [34] | 2002-2003 | Iran | 85 | 35 (±12) | 68 (80%) | 4.00 | - | - | Prospective hospital based data collection study |
| Rahimi-Movaghar et al., [35] | September 2007- January 2008 | Iran | 4 | 31(±7) | 2 (50%) | 1.00 | 44 | 4.4 (per 10 000) | Population-based survey study |
| Chabok <i>et al.</i> , [36] | 2005-2006 | Iran | 44 | 38.2 | - | - | - | - | Retrospective review of hospital database |
| Otom et al., [37] | January 1988- December 1993 | Jordan | 151 | 30 | 129 (85.4%) | 5.86 | 18 | - | Retrospective chart review |
| Raibulet <i>et al.</i> , [38] | 1991-1999 | Kuwait | 90 | 20.6 | 79 (8.7%) | 7.18 | 7.8 | - | Retrospective chart review |
| Alshahri SS <i>et al.</i> , [39] | January 2012- December2015 | Saudi Arabia | 216 | 28.94 | 187 (86.5%) | 6.45 | - | - | Retrospective chart review |
| Alhoseini <i>et al.</i> , [40] | March 2010- July 2011 | Iran | 138 | 33.2 (±14.3) | 117 (84.8%) | 5.57 | 10.5 | - | Retrospective hospital based chart review |
| Fakharian <i>et al.</i> , [41] | 1995-1999 | Iran | 39 | 39 (±18) | 31 (79.4%) | 3.88 | 30 | - | Prospective hospital study |
| Quinones <i>et al.</i> , [42] | 1987-1996 | Qatar | 75 | 32 | 67 (89.24%) | 8.38 | 12.5 | - | Retrospective hospital study |

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| Cosar <i>et al.</i> , [33] | Alshahri <i>et al.</i> , [32] | Karacan <i>et al.</i> , [31] | Dincer et al., [30] | Karamehmeto- glul <i>et al.</i> , [29] | Atci <i>et al.</i> , [28] | Movaghar <i>et al.</i> , [27] | El Tallawy <i>et al.</i> , [26] | Alfrayh <i>et al.</i> , [25] | Karamehmeto- glul <i>et al.</i> , [24] | Mahmoud <i>et al.</i> , [23] | Erdoğan <i>et al.</i> , [22] | Erhan <i>et al.</i> , [21] | Gur <i>et al.</i> , [20] | Derakhshanrad <i>et al.</i> , [19] | Tasoglu <i>et al.</i> , [18] | Al-Habib <i>et al.</i> , [17] | Rahimi- Movaghar <i>et al.</i> , [16] | Al-Jadid <i>et al.</i> , [15] | Al-Jadid <i>et al.</i> , [14] | Study ID (Refer-Scale (Fran-Scale A S ence) ke l/ASIA) (%) B |
|----------------------------|----------------------------------|---------------------------------|---------------------|---|---------------------------|----------------------------------|------------------------------------|---------------------------------|---|---------------------------------|---------------------------------|----------------------------|-------------------------------------|---------------------------------------|---------------------------------|----------------------------------|---|----------------------------------|----------------------------------|---|
| ' | ı | | | | | I | , ASIA | | ı | , ASIA | ASIA | ASIA | I | ASIA | ASIA | ı | 1 | ı | · | - Scale (Fran- ke l/ASIA) |
| 94 (74%) | ı | ı. | | , | | ı. | 1 (16.7%) | ı. | I | 261 (83.7%) | 65 (15.9%) | 56 (55%) | | 608 (53.5%) | 93 (35.5%) | ı | | ı | ı | Scale A (%) |
| 18 (14.3%) | I | , | ' | ľ | | T | I | I | I | 25 (8.01%) | Ó | | 1 | 203 (18.7%) | 43 (16%) | T | 1 | T | ı | Scale B (%) |
| 8 (6.2%) | · | ı | 1 | ı | 1 | I | 1 (16.7%) | T | I | 25 26 (8.01%) (8.33%) | | 45 (45%) | 1 | 200 (17.6%) | 56 (21.4%) | I | ' | I. | ı | Scale C (%) |
| 8 (6.2%) 7 (5.5%) | ı | 1 | • | 1 | 1 | ı | 4 (66.7%) | , i | ı | 1 | | | 1 | 109 (9.6%) | 69 (26.3%) | ı. | ı | , | | Scale D (%) |
| 1 | I | , | 1 | ' | 1 | ı | ı | 1 | ı | | 344 (84.1%) | | | 7 (0.6%) | 1 (0.04%) | ı | ı | ı | ľ | Scale E (%) |
| Tetra: 36 (28.3%) | 90 (29%) | 394 (67.8%) | 1442 (85.12%) | 44 (58.7%) | | 1 | | | 102 (67%) | 239 (76.6%) | | | 243(45.08%) | 7 (0.6%) 496 (43.6%) | 76 (29%) | ľ | 278 (56.04%) | | | Complete para- plegia (%) |
| | 66 (22%) | 187 (32.18%) | 82 (4.84%) | 31 (41.3%) | | | | | 50 (33%) | 73 (23.4%) | | | 75 (13.91%) | 115 (10.1)% | 16 (6.1%) | | 99 (19.9%) | | | Complete tetra plegia (%) |
| Para: 76 (59.8%) | 56 (18%) | | 116 (6.85%) | | | 1 | ı | | ı | | | | 148 (27.48%) | 308 (27.1%) | 117 (44.7%) | 1 | 73 (14.71%) | 1 | | Incomplete paraplegia (%) |
| Ŭ | 95 (31%) | | 54 (3.19%) | | | 1 | · | | ı | 1 | | | 74 (13.72%) | 218 (19.2%) | 53 (20.2%) | 1 | 39 (7.86%) | 1 | | Incomplete tet- raplegia (%) |
| I | I | 184 (31.7%) | • | I | 12(13.1%) | I | 3 (50%) | I | 50 (33%) | 1 | | 50 (47.2%) | cervical:12 | 358 (31.5%) | 69 (26.3%) | 9 (39%) | | 146 (31.33%) | ı | Cervical |
| T | | 156 (26.6%) | | 1 | 56 (61.53%) | ı | 1 (16.7%) | T | ı | 1 | | 37 (34.9%) | 37 (25.41%), | 658 (57.9%) | 121 (46.2%) | 11 (47.8%) | | 225 (48.28%) | ' | Thoracic |
| ı | ı | 162 (27.8%) | | | 23 (25.27%) | | 1 (16.7%) 2 (33.3%) | | 102 (67%) | | | 13 (12.3%) | cervical:137 (25.41%), thoracic:198 | 121 (10.6%) | 72 (27.5%) | 109 (43.5%) | I | 95 (20.4%) | | Lumbar/sac ral |

| | | | | | | | | | Lumbar/sac | ral | | 95 (20.4%) | | 109 (43.5%) | 72 (27.5%) | 121 (10.6%) | horacic:198 | 13 (12.3%) |
|-----------------------------------|---|--------------------------------|-------------------|----------------------------------|------------------------------------|-----------------------------------|-----------------------------------|----------------------------------|---|------------------|----------------------------------|----------------------------------|---|----------------------------------|---------------------------------|---------------------------------------|-------------------------------------|------------------|
| | 1 | • | 103 (68.2%) | | 1 | · | 1 | 43 (57.3%) 32 (42.66%) | Cervical Thoracic L | ri Li | 1 | 225 9. (48.28%) | 1 | 11 1(47.8%) | 121 7. (46.2%) | | cervical:137 (25.41%), thoracic:198 | 37 1. (34 9%) |
| ı | ı | | 48 (31.8%) | ~ 1 | | | ı | 43 (57.3%) | | | ı | 146 (31.33%) | ı | 9 (39%) | 69 (26.3%) | 358 (31.5%) | cervical:1 | 50 (A7 206) |
| | ı | | ı | | 47 (21.75%) | (% | 1 | 20 (26.6%) | | tetraplegia (%) | 1 | 1 | 39 (7.86%) | | 53 (20.2%) | 218 (19.2%) | 74 (13.72%) | , , 1 |
| ı | | 29 (65.9%) | ı | ı | 53 (24.53%) | Para: 113 (81.9%) | | 11 (14.7%) | Incomplete | paraplegia (%) | ı | 1 | 73 (14.71%) | | 117 (44.7%) | 308 (27.1%) | 148 (27.48%) | 1 |
| | ı | 11 (25%) | 1 | | 36 (16.66%) | | | 23 (30.7%) | Complete | tetra plegia (%) | | | 99 (19.9%) | | 16 (6.1%) | 115 (10.1)% | 75 (13.91%) | |
| ı | 1 | 4 (9.1%) | 1 | | 80 (37.03%) | Tetra: 25 (18.1%) | | 21 (28%) | Complete | paraplegia (%) | | | 278 (56.04%) | | 76 (29%) | 496 (43.6%) | 243(45.08%) | |
| ı | 1 | | ı | | ı | | | | Scale E | (%) | I | I | ı | 1 | 1(0.04%) | 7 (0.6%) | | |
| | | | 21 (13.9%) | 9 (9.9%) | | 3 (2.2%) 11 (8%) | 1 | ı | | (%) | ı | ı. | | | 69 (26.3%) | 109 (9.6%) | т | (9 |
| (0)/ | ı. | | 34 (22.5%) | | 1 | | | | | (%) | I | ı. | | ı | 56 (21.4%) | 200) (17.6%) | ı | 45 (45%) |
| 51 (60%) | 1 | | 15 (10%) |) 21 (22.7% | · 1 | 5 (3.6%) | · 1 | | dies. Scale | B (%) | I | 1 | ı | ı | 43 (16%) | 203 (18.7%) | | |
| 28 (32.94%) | 1 | | 81 (53.6%) | 26 (29%) 21 (22 | ı | 119 (86.2%) | 1 | | - Scale A | (%) | I | i. | ı | | 93 (35.5%) | 608 (53.5%) | т | 56 (55%) |
| Frankel | I | | Frankel | Frankel | | ASIA | | 1 | istics of the inc Scale (Fran- | ke l/ASIA) | 1 | 1 | ı | | ASIA | ASIA | ı | ASIA |
| Taghippor <i>et al.</i> , [34] | Rahimi- Movaghar <i>et al.</i> , [35] | Chabok <i>et al.</i> , [36] | Otom et al., [37] | Raibulet <i>et al.</i> , [38] | Alshahri SS <i>et</i> al., [39] | Alhoseini <i>et al.</i> , [40] | Fakharian <i>et al.</i> , [41] | Quinones <i>et al.</i> , [42] | Table 3. Characteristics of the included studies.Study IDScale (Fran- Scale A Scale Scale A Scale A Scale A Scale A Scale B | (Reference) | Al-Jadid <i>et al.</i> , [14] | Al-Jadid <i>et al.</i> , [15] | Rahimi- Movaghar <i>et al.</i> , [16] | Al-Habib <i>et al.</i> , [17] | Tasoglu <i>et al.</i> , [18] | Derakhshanrad <i>et al.</i> , [19] | Gur <i>et al.</i> , [20] | T |

| | | 102 (67%) | | 2 (33.3%) | | 23 (25.27%) | | | 162 (27.8%) | | | | | | | | | | | |
|---------------------------------|---------------------------------|---|---------------------------------|---|----------------------------------|---------------------------|---|---------------------|---------------------------------|----------------------------------|----------------------------|------------------------------|---|--------------------------------|-------------------|----------------------------------|------------------------------------|-----------------------------------|-----------------------------------|----------------------------------|
| | ī | 102 | ı. | | ı. | | i. | ı | | ı | ı | ı. | I | ı | 103 (68.2%) | ı | , | | i. | 32 (42.66%) |
| | i. | - (0) | , |) 1 (16.7%) | i. | 56 (61.53%) | i. | | 156 (26.6%) | ı | ı | | ı. | ı | | ı | i. | | i. | |
| | ı. | 50 (33%) | | 3 (50%) | | 12 (13.1%) | 1 | · | 184 (31.7%) | I | | ı | | | 48 (31.8%) | ı | · | | | 43 (57.3%) |
| ı | ı | · | ı | ı | | | 1 | 54 (3.19%) | | 95 (31%) | (% | 1 | ı | | ı | | 47 (21.75%) | 6%6 | | 20 (26.6%) |
| ı | ı | ı | ı | ı | | | ı | 116 (6.85%) | ı | 56 (18%) | Para: 76 (59.8%) | • | | 29 (65.9%) | | · | 53 (24.53%) | Para: 113 (81.9%) | | 11 (14.7%) |
| ı | 73 (23.4%) | 50 (33%) | | | | | 31 (41.3%) | 82 (4.84%) | 187 (32.18%) | 66 (22%) | (% | T | | 11 (25%) | | • | 36 (16.66%) | (0, | | 23 (30.7%) |
| | 239 (76.6%) | 102 (67%) | | | | | 44 (58.7%) | 1442 (85.12%) | 394 (67.8%) | 90 (29%) | Tetra: 36 (28.3%) | | ı | 4 (9.1%) | | | 80 (37.03%) | Tetra: 25 (18.1%) | | 21 (28%) |
| 344 (84.1%) | | ı | | ' | | | i. | | i. | ı | - | ı. | I. | ī | ' | - () | | ' | | |
| | ī | I | ı | 4 (66.7%) | ı. | | T | ı | I. | I | 8 (6.2%) 7 (5.5%) | | 1 | ı | 21 (13.9%) | 9 (9.9%) | ı | 3 (2.2%) 11 (8%) | ī | |
| | 26 (8.33%) | ı | | 1 (16.7%) | | | 1 | | ı. | ı | | () | ı | ı | 34 (22.5%) | 21 34 (22.7%) (38.3%) | 1 | 3 (2.2% | 1 | |
| (0) | 25 (8.01%) | I | ı | - - | ī | 1 | I | ı | I | I |) 18 (14.3%) | 51 (60%) | 1 | ī | 15 (10%) |) 21 (22.7% | · I | 5 (3.6%) | ī | |
| 65 (15.9%) | 261 (83.7%) | ı | | 1 (16.7%) | | | i. | | ı. | ı | 94 (74%) 18 (14 | 28 (32.94%) | ı | | 81 (53.6%) | 26 (29%) 21 (22 | | 119 (86.2%) | | |
| ASIA | ASIA | ı | | ASIA | | | 1 | 1 | 1 | ı | | Frankel | I | | Frankel | Frankel | | ASIA | 1 | |
| Erdoğan <i>et al.</i> , [22] | Mahmoud <i>et al.</i> , [23] | Karamehmeto- glul <i>et al.</i> , [24] | Alfrayh <i>et al.</i> , [25] | El Tallawy <i>et al.</i> , ASIA [26] | Movaghar <i>et al.</i> , [27] | Atci <i>et al.</i> , [28] | Karamehmeto- glul <i>et al.</i> , [29] | Dincer et al., [30] | Karacan <i>et al.</i> , [31] | Alshahri <i>et al.</i> , [32] | Cosar <i>et al.</i> , [33] | Taghippor et al.,Frankel[34] | Rahimi- Movaghar <i>et al.</i> , [35] | Chabok <i>et al.</i> , [36] | Otom et al., [37] | Raibulet <i>et al.</i> , [38] | Alshahri SS <i>et</i> al., [39] | Alhoseini <i>et al.</i> , [40] | Fakharian <i>et al.</i> , [4]] | Quinones <i>et al.</i> , [42] |

| I able 4. Characteristics of the included studies. Study ID (Reference) Motor accidet | ncluded studies. Motor accident | Falls | Gunshot | Sport-related | Violence (| Others | 6-0 | 10 to 19 | 20-29 | 30-39 | 40-49 | 50-59 | 69-09 | ≥70 |
|---|------------------------------------|-----------------|--------------------|---------------|-----------------|----------------|---|---------------------------|------------------------------|--------------------------------|--|-------------------|-------------------|---------------|
| Al-Jadid <i>et al.</i> , [14] | 1 | ı | ı | 1 | 1 | | 1 | 55 (11.11%) | 198 (40%) | 98 (19.8%) | 60 (12.12%) | 31 (6.26%) | 42 (8.5%) | 11 (2.22%) |
| Al-Jadid <i>et al.</i> , [15] | 377 (80.9%) | 51 (10.94%) | 30 (6.45) | 3 (0.64%) | 5 (1.07%) | | 0-15: 32 (6 | 6.9%), 16-3 | 30: 270 (58 | %), 31-45: | 0-15: 32 (6.9%), 16-30: 270 (58%), 31-45:100 (21.4%), ≥45: 64 (13.7%) | , ≥45: 64 (1: | 3.7%) | |
| Rahimi-Movaghar <i>et al.</i> , [16] | ı | I | ı | 1 | 1 | 1 | 3 (0.6%) | 33 (6.65%) | 133 (26.81%) | 118 (23.79%) | 104 (20.96%) | ≥50: 105 (21.17%) | 21.17%) | |
| Al-Habib et al., [17] | 13 (56.5%) | 8 (35%) | 2 (8.6%) | | | | 1 | | ı | 1 | 1 | ı | ı | |
| Tasoglu <i>et al.</i> , [18] | 79 (30.2%) | | 17 (6.46%) | 5 (1.9%) | 20 (7.6%) (| 51 (19.44%) | 0-15: 17 (6%), 16-30: 8 (13.1%). ≥76: 4 (1.5%) | 5%), 16-30 76: 4 (1.5% | r: 86 (32.5% %) | (), 31-45:68 | 0-15: 17 (6%), 16-30: 86 (32.5%), 31-45:68 (25.9%), 46-60: 56 (21%), 61-75: 32 (13.1%). ≥ 76 : 4 (1.5%) | 6-60: 56 (21 | %), 61-75 | 32 |
| Derakhshanrad <i>et al.</i> , [19] | 703 (61.8)% | | 1 | 32 (2.8%) | | 80 (7.1%) | | 76 (6.7%) | 646 (56.8% | 316 (27.8%) | 86 (7.6%) | 13 (1.1%) | | |
| Gur <i>et al.</i> , [20] | 200 (37.1%) | 172 (32%) | 115 (21.33%) | | | 41 (7.6%) | 0-14:32 (5. (4.45%) | 9%), 15-2 | 9:261 (48.4 | 12%), 30-4 | 0-14:32 (5.9%), 15-29:261 (48.42%), 30-44:158 (29.3%),45-59:64 (11.87%),≥60:24 (4.45%) | (0),45-59:64 | (11.87%); | 60:24 |
| Erhan <i>et al.</i> , [21] | 43 (40.6%) | 36 (34%) | 10 (9.4%) | 11 (10.4%) | | 6 (5.7%) | 1 | 1 | 1 | 1 | 1 | 1 | T | |
| Erdoğan <i>et al</i> ., [22] | 68 (16.6%) | 292 (71.4%) | | 14 (3.4%) | | 35 (8.6%) | | | | | | ı | ı | |
| Mahmoud <i>et al.</i> , [23] | I | I | | I | | | 1 | | ı | I | ī | ī | ı | |
| Karamehmetoglul <i>et al.</i> , [24] | 62 (41%) | 65 (43%) | 8 (5%) | | 3 (2%) | 11 (7%) | 4 (2.63%) | 16 (10.5%) | 54 (35.5%) | 35 (23.02%) | 20 (13.15%) | 12 (7.89%) | 8 (5.26%) | 3 (1.97%) |
| Alfrayh <i>et al.</i> , [25] | | | | | | | | | | | | | | |
| El Tallawy <i>et al.</i> , [26] | ı | | 1 | I | | | 1 | | ı | | | ı | | |
| Movaghar <i>et al.</i> , [27] | ı | 1 | ı | I | | | I | | 1 | 1 | | 1 | | |
| Atci <i>et al.</i> , [28] | 34 (37.36%) | 54 (59.3%) | 1 | 2 (2.2%) | 1 (1.1%) - | | 1 | 6 (6.6%) | 18 (19.8%) | 21 (23.08%) | 23 (25.27%) | 12 (13.19%) | 4 (4.4%) 7 (7.7%) | 7 (7.7%) |
| Karamehmetoglul <i>et al.</i> , [29] | 19 (25.3%) | 28 (37.3%) | 22 (29.3%) | 1 | 1 (1.3%) - | I | 2 (2.6%) | 5 (6.7%) | 29 (38.7%) | 17 (22.7%) | 15 (20%) | 5 (6.7%) | 2 (2.7%) | |
| Dincer et al., [30] | 600 (35.41%) | 500 (29.51%) | 372 (21.95%) | ı | 34 (2%)] ((| 188 (11.1%) | 58 (3.42%) | 394 (23.26%) | 394 548 (23.26%) (32.35%) | 360 (21.25%) | 196 (11.57%) | 110 (6.49%) | 28 (1.65%) | |
| Karacan <i>et al.</i> , [31] | 286 (48.8%) | 212 (36.5%) | 11 (1.9%) 7 (1.2%) | 7 (1.2%) | 19 | | 9 (1.5%) | 57 (9.8%) | 180 (30.9%) | 127 (21.9%) | 87 (15%) | 67 (11.8%) | 40 (6.9%) | 10(1.8%) |
| Alshahri <i>et al.</i> , [32] | 262 (85%) | 28 (9%) | 14 (5%) | 3 (1%) | I | · | (14–15 =8 (3%)) | (3%)), (16 | 5-30=196 (0 | 64%)),(31– | (14–15 =8 (3%)), (16–30=196 (64%)),(31–45=72 (23%)),(46–60=23 (7%)) ,(61–75=8 (3%)) | 6)),(46–60=2 | 23 (7%)), ((| 61-75=8 |
| Cosar <i>et al.</i> , [33] | 70 (55.1%) | 43 (33.9%) | 10 (7.9%) | 4 (3%) | | | | | ı | ı | | | 1 | |
| Taghippor <i>et al</i> ., [34] | 34 (40%) | 32 (37.64%) | ı | | 2 (2.35%) (| 1 (1.17%) | 2 (2.35%) | 10 (11.76%) | 10 31 (11.76%) (36.47%) | 18 (21.17%) | 8 (8.4%) | 11 (12.94%) | 60+: 5 (5.8%) | (%) |
| <i>et al.</i> , [35] | 3 (75%) | 1 (25%) | | | | | | | | | | | | |
| Chabok <i>et al.</i> , [36] | ı | ı | ı | | | | 1 | | | | ı | ı | | |

| Otom <i>et al.</i> , [37] | 67 (44.4%) | 32 (21.2%) | 39 (25.8%) | 4 (2.6%) | 3 (2%) | 6 (4%) | 3 (2%) 6 (4%) 0-19: 37 (24.5%) 54 (35.) | () 54 (35.8%) | 54 24 (35.8%) (15.9%) | More than 40: 36 (23.8%) | (23.8%) |
|----------------------------------|-------------|----------------|---------------|----------|----------|-------------------|---|--|--------------------------|--------------------------|---|
| Raibulet et al., [38] | 57 (63.3%) | 22 (24.7%) | 1 | , | 2 (2.2%) | 2 (2.2%) 8 (8.9%) | • | | 1 | • | 1 |
| Alshahri SS <i>et al.</i> , [39] | 196 (90.8%) | 7 (3.2%) | I | 1 | 13 (6%) | ı | - 14-25 65:8 (| 65:8 (3.7%), 66+:5 (2.3%) 65:8 (3.7%), 66+:5 (2.3%) | 5-35:53 (24.5 2.3%) | 5%), 36-45:16 (7.4% | 14-25:118 (55%), 26-35:53 (24.5%), 36-45:16 (7.4%), 46-55:16 (7.4%), 56- 65:8 (3.7%), 66+:5 (2.3%) |
| Alhoseini <i>et al.</i> , [40] | 56 (40.57%) | 63 (45.65%) | I | ı | I | 19 (1376%) | 1 | · | ı | | |
| Fakharian <i>et al.</i> , [41] | 1 | | 1 | 1 | 1 | 1 | Less 20: 3 (7.7%), 20-50: 27 (69.2%), more 50: 9 (23.07%) | 6), 20-50: 27 (6 | (9.2%), more | \$50:9 (23.07%) | |
| Quinones et al., [42] | 54 (72%) | 10 (13.3%) | I | , | I | 11 (14.7%) | | | ı | | |
| | | | | | | | | | | | |

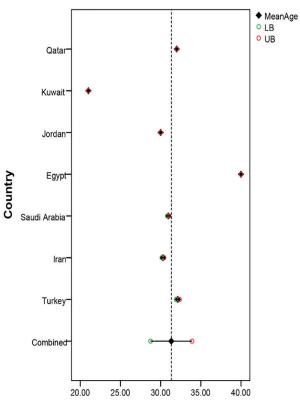


Fig. 2. Random pooled mean age

| Study | Events | Total | | Proportion | 95%-CI | Weight |
|--|---|--|---------------------|--|---|---|
| Country = Egypt El Tallawy et al. 2013 Random effects model Heterogeneity: not applicable | 5 | 6 6 | | | [0.36; 1.00] [0.37; 0.98] | 0.7% 0.7% |
| Country = Iran Rahimi-Movaghar et al. 2010 Derakhshanrad et al. 2016 Taghippor et al. 2015 Rahimi-Movaghar et al. 2009 Alhoseini et al. 2014 Fakharian et al. 2004 Random effects model Heterogeneity: / ² = 82%, r ² = 0. | 901 68 2 117 31 | 1137 85 4 138 39 1899 | +==+ +++ | 0.79 0.80 0.50 0.85 0.79 | [0.65; 0.73] [0.77; 0.82] [0.70; 0.88] [0.07; 0.93] [0.78; 0.90] [0.64; 0.91] [0.71; 0.83] | 4.5% 4.6% 3.5% 0.8% 3.7% 2.7% 19.9% |
| Country = Jordan Otom et al. 1997 Random effects model Heterogeneity: not applicable | 129 | 151 151 | # ♦ | | [0.79; 0.91] [0.79; 0.90] | 3.8% 3.8% |
| Country = Kuwait Raibulet et al. 2001 Random effects model Heterogeneity: not applicable | 79 | 90 90 | *\$ | | [0.79; 0.94] [0.79; 0.93] | 3.2% 3.2% |
| Country = Qatar Quinones et al. 2002 Random effects model Heterogeneity: not applicable | 67 | 75 75 | * \$ | | [0.80; 0.95] [0.80; 0.95] | 2.9% 2.9% |
| Country = Saudi Arabia Al-Jadid et al. 2010 Al-Jadid et al. 2010 Al-Habib et al. 2014 Mahmoud et al. 2017 Alshahri at al. 2012 Alshahri at al. 2012 Alshahri SS et al. 2016 Random effects model Heterogeneity: J ² = 97%, r ² = 0. | 404 398 17 244 130 271 187 7131, p < | 466 23 418 260 307 216 2185 | *** *** | 0.85 0.74 0.58 0.50 0.88 0.87 | [0.78; 0.85] [0.82; 0.88] [0.52; 0.90] [0.53; 0.63] [0.44; 0.56] [0.84; 0.92] [0.81; 0.91] [0.64; 0.87] | 4.4% 4.4% 2.3% 4.5% 4.4% 4.1% 4.0% 28.1% |
| Country = Turkey Tasoglu et al. 2016 Gur et al. 2005 Erdogan et al. 2005 Karamehmetoglul et al. 1995 Atci et al. 2016 Karamehmetoglul et al. 1997 Dincer et al. 1992 Karacan et al. 2000 Cosar et al. 2000 Cosar et al. 2000 Heterogeneity: J ² = 81%, r ² = 0. | 415 86 | 539 106 409 152 91 75 1694 581 127 4036 | *********** | 0.77 0.66 0.62 0.75 0.70 0.85 0.76 0.71 0.68 | $\begin{matrix} [0.64; \ 0.75] \\ [0.73; \ 0.81] \\ [0.56; \ 0.75] \\ [0.57; \ 0.67] \\ [0.67; \ 0.82] \\ [0.60; \ 0.79] \\ [0.75; \ 0.92] \\ [0.74; \ 0.78] \\ [0.68; \ 0.76] \\ \hline \begin{matrix} [0.58; \ 0.76] \\ [0.68; \ 0.76] \end{matrix} \end{matrix}$ | 4.3% 4.5% 3.9% 4.5% 4.1% 3.8% 3.2% 4.6% 4.5% 4.0% 41.4% |
| Random effects model Heterogeneity: l^2 = 92%, τ^2 = 0. | 2179, p < | 8442 0.01 | 0.2 0.4 0.6 0.8 | 0.77 | [0.73; 0.80] | 100.0% |
| Fig 2 A forest m | latak | | ng the needed activ | moto of | mala aa | ndar |

Fig. 3. A forest plot showing the pooled estimate of male gender.

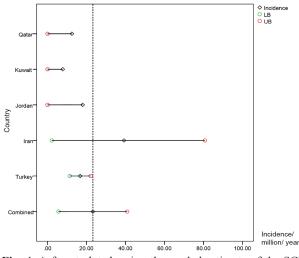


Fig. 4. A forest plot showing the pooled estimate of the SCI incidence/million/year

Incompleteness of the Injury

Incomplete paraplegia injury showed a random pooled estimate of 20% (95% CI: 13-30%) (Figure 5). And, incomplete tetraplegia injury has a random pooled estimate of 15% (95% CI: 9-24%) (Figure 5).

Level of the Injury

Injury at the cervical level was found to have a random pooled estimate of 31% (95% CI: 27-36%) (Figure 6) whereas, the random pooled estimate for thoracic-level injury was 42% (95% CI: 32-53%) (Figure 6) and, the random pooled estimate for lumbar/sacral level injury was 29% (95% CI: 19-42%) (Figure 6).

Etiology of the Injury

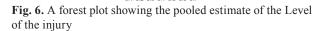
The random pooled estimates for motor vehicle accidents (MVA), falls, gunshots, sports and violence

| Complete Paraplegia | Events | Total | | Proportion | 95%-CI | Weight (fixed) | Weight (random) |
|--|---|---|-----------------------------|---|---|--|---|
| Rahimi-Movaghar et al. 2010 | | 496 | ; | | [0.52; 0.60] | | |
| Tasoglu et al. 2016 Derakhshanrad et al. 2016 | 76 496 | 262 1137 | | 0.29 0.44 | | | |
| Gur et al. 2005 | 243 | 539 | | 0.44 | | | |
| Mahmoud et al. 2017 | 239 | 418 | | 0.57 | | | |
| Karamehmetoglul et al. 1995 | 102 | 152 | | - 0.67 | | | 8.4% |
| Karamehmetoglul et al. 1997 | 44 | 75 | 1 | 0.59 | | | |
| Karacan et al. 2000 | 394 | 581 | | 0.68 | | | |
| Alshahri at al. 2012 Chabok et al. 2010 | 90 4 | 307 44 | | 0.29 | 0 [0.24; 0.35] 0 [0.03; 0.22] | | |
| Alshahri SS et al. 2016 | 80 | 216 | | 0.37 | | | |
| Quinones et al. 2002 | 21 | 75 | | | [0.18; 0.40] | | |
| Fixed effect model | | 4302 | - \$ | 0.48 | [0.47; 0.50] | 100.0% | |
| Random effects model | | | | 0.44 | [0.37; 0.53] | | 100.0% |
| Heterogeneity: $I^2 = 96\%$, $\tau^2 = 0$. | 296, $p < 0$ | .01 | 0.1 0.2 0.3 0.4 0.5 0.6 0.7 | | | | |
| | | | 0.1 0.2 0.0 0.4 0.0 0.0 0.7 | | | Weight | |
| Complete Tetraplegia | Events | | | Proportion | | | (random) |
| Rahimi-Movaghar et al. 2010 | 99 | 496 | | | [0.17; 0.24] | | 8.8% |
| Tasoglu et al. 2016 | 16 | 262 | | 0.06 | | | 7.7% |
| Derakhshanrad et al. 2016 | 115 | 1137 | <u> </u> | 0.10 | | | 8.9% |
| Gur et al. 2005 | 75 | 539 | | 0.14 | | | 8.8% |
| Mahmoud et al. 2017 | 73 50 | 418 152 | | 0.17 0.33 | | | 8.7% 8.4% |
| Karamehmetoglul et al. 1995 Karamehmetoglul et al. 1997 | 31 | 75 | | - 0.41 | | | 8.4% 7.9% |
| Karacan et al. 2000 | 187 | 581 | | | [0.30, 0.33] | | 9.0% |
| Alshahri at al. 2000 | 66 | 307 | | 0.32 | | | 8.7% |
| Chabok et al. 2010 | 11 | 44 | | | [0.17; 0.27] [0.13; 0.40] | | 6.8% |
| Alshahri SS et al. 2016 | 36 | 216 | | | [0.12; 0.22] | | 8.4% |
| Quinones et al. 2002 | 23 | 75 | 1; 1; | | [0.21; 0.42] | | 7.8% |
| | | | | | | | |
| Fixed effect model | | 4302 | \$ | | [0.19; 0.21] | | |
| Random effects model Heterogeneity: $I^2 = 95\%$, $\tau^2 = 0$. | 2502 5 - | 0.01 | | 0.20 | [0.15; 0.27] | | 100.0% |
| heterogeneity. 7 = 55 %, t = 6. | | | | | | | |
| | - | | 01 02 03 04 05 | | | | 10/- : |
| Incomplete Paraplegia | Events | | 0.1 0.2 0.3 0.4 0.5 | Proportion | 95%-CI | Weight (fixed) | Weight (random) |
| | | Total | 0.1 0.2 0.3 0.4 0.5 | - | | (fixed) | (random) |
| Rahimi–Movaghar et al. 2010 | 73 | Fotal 496 | 0.1 0.2 0.3 0.4 0.5 | 0.15 | [0.12; 0.18] | (fixed) 9.4% | (random) 12.7% |
| Rahimi−Movaghar et al. 2010 Tasoglu et al. 2016 | 73 117 | Fotal 496 262 | 0.1 0.2 0.3 0.4 0.5 | 0.15 0.45 | [0.12; 0.18] [0.39; 0.51] | (fixed) 9.4% 9.8% | (random) 12.7% 12.7% |
| Rahimi−Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 | 73 117 308 | Fotal 496 262 1137 | 0.1 0.2 0.3 0.4 0.5 | 0.15 0.45 0.27 | [0.12; 0.18] [0.39; 0.51] [0.25; 0.30] | (fixed) 9.4% 9.8% 33.9% | (random) 12.7% 12.7% 12.9% |
| Rahimi–Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 | 73 117 308 148 | Fotal 496 262 1137 539 | | 0.15 0.45 0.27 0.27 | [0.12; 0.18] [0.39; 0.51] [0.25; 0.30] [0.24; 0.31] | (fixed) 9.4% 9.8% 33.9% 16.2% | (random) 12.7% 12.7% 12.9% 12.8% |
| Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 1992 | 73 117 308 148 116 | Fotal 496 262 1137 539 1694 + | | 0.15 0.45 0.27 0.27 0.07 | [0.12; 0.18] [0.39; 0.51] [0.25; 0.30] [0.24; 0.31] [0.06; 0.08] | (fixed) 9.4% 9.8% 33.9% 16.2% 16.3% | (random) 12.7% 12.7% 12.9% 12.8% 12.8% |
| Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 1992 Alshahri at al. 2012 | 73 117 308 148 116 56 | Fotal 496 262 1137 539 1694 307 | | 0.15 0.45 0.27 0.27 0.07 0.18 | [0.12; 0.18] [0.39; 0.51] [0.25; 0.30] [0.24; 0.31] [0.06; 0.08] [0.14; 0.23] | (fixed) 9.4% 9.8% 33.9% 16.2% 16.3% 6.9% | (random) 12.7% 12.9% 12.8% 12.8% 12.8% 12.6% |
| Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 1992 Alshahri at al. 2012 Alshahri SS et al. 2016 | 73 117 308 148 116 56 53 | Fotal 496 262 1137 539 1694 307 216 | | 0.15 0.45 0.27 0.27 0.07 0.07 0.18 0.25 | $\begin{matrix} [0.12; \ 0.18] \\ [0.39; \ 0.51] \\ [0.25; \ 0.30] \\ [0.24; \ 0.31] \\ [0.06; \ 0.08] \\ [0.14; \ 0.23] \\ [0.19; \ 0.31] \end{matrix}$ | (fixed) 9.4% 9.8% 33.9% 16.2% 16.3% 6.9% 6.0% | (random) 12.7% 12.9% 12.8% 12.8% 12.8% 12.6% 12.5% |
| Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 1992 Alshahri at al. 2012 | 73 117 308 148 116 56 | Fotal 496 262 1137 539 1694 307 | | 0.15 0.45 0.27 0.27 0.07 0.07 0.18 0.25 | [0.12; 0.18] [0.39; 0.51] [0.25; 0.30] [0.24; 0.31] [0.06; 0.08] [0.14; 0.23] | (fixed) 9.4% 9.8% 33.9% 16.2% 16.3% 6.9% | (random) 12.7% 12.9% 12.8% 12.8% 12.8% 12.6% |
| Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 1992 Alshahri at al. 2012 Alshahri SS et al. 2016 | 73 117 308 148 116 56 53 11 | Fotal 496 262 1137 539 1694 307 216 | | 0.15 0.45 0.27 0.27 0.07 0.18 0.25 0.15 | $\begin{matrix} [0.12; \ 0.18] \\ [0.39; \ 0.51] \\ [0.25; \ 0.30] \\ [0.24; \ 0.31] \\ [0.06; \ 0.08] \\ [0.14; \ 0.23] \\ [0.19; \ 0.31] \end{matrix}$ | (fixed) 9.4% 9.8% 33.9% 16.2% 16.3% 6.9% 6.0% 1.4% | (random) 12.7% 12.9% 12.8% 12.8% 12.8% 12.6% 12.5% |
| Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 1992 Alshahri at al. 2012 Alshahri SS et al. 2016 Quinones et al. 2002 Fixed effect model Random effects model | 73 117 308 148 116 56 53 11 | Fotal 496 262 1137 539 1694 307 216 75 4726 | | 0.15 0.45 0.27 0.27 0.07 0.18 0.25 0.15 0.21 | $\begin{matrix} [0.12; \ 0.18] \\ [0.39; \ 0.51] \\ [0.25; \ 0.30] \\ [0.24; \ 0.31] \\ [0.06; \ 0.08] \\ [0.14; \ 0.23] \\ [0.19; \ 0.31] \\ [0.08; \ 0.25] \end{matrix}$ | (fixed) 9.4% 9.8% 33.9% 16.2% 16.3% 6.9% 6.0% 1.4% | (random) 12.7% 12.9% 12.8% 12.8% 12.8% 12.6% 12.5% |
| Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 1992 Alshahri at al. 2012 Alshahri SS et al. 2016 Quinones et al. 2002 Fixed effect model | 73 117 308 148 116 56 53 11 | Fotal 496 262 1137 539 1694 307 216 75 4726 | | 0.15 0.45 0.27 0.27 0.7 0.18 0.25 0.15 0.21 0.20 | [0.12; 0.18] [0.39; 0.51] [0.25; 0.30] [0.24; 0.31] [0.16; 0.08] [0.14; 0.23] [0.19; 0.31] [0.08; 0.25] [0.20; 0.23] | (fixed) 9.4% 9.8% 33.9% 16.2% 16.3% 6.9% 6.0% 1.4% | (random) 12.7% 12.9% 12.8% 12.8% 12.6% 12.6% 12.5% 11.0% |
| Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 1992 Alshahri at al. 2012 Alshahri SS et al. 2016 Quinones et al. 2002 Fixed effect model Random effects model | 73 117 308 148 116 56 53 11 | Fotal 496 262 1137 539 1694 307 216 75 4726 | | 0.15 0.45 0.27 0.27 0.7 0.18 0.25 0.15 0.21 0.21 | [0.12; 0.18] [0.39; 0.51] [0.25; 0.30] [0.24; 0.31] [0.14; 0.23] [0.19; 0.31] [0.08; 0.25] [0.20; 0.23] [0.13; 0.30] | (fixed) 9.4% 9.8% 33.9% 16.2% 16.3% 6.9% 6.0% 1.4% | (random) 12.7% 12.7% 12.8% 12.8% 12.6% 12.6% 12.5% 11.0% |
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| Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 2092 Alshahri at al. 2012 Alshahri SS et al. 2016 Quinones et al. 2002 Fixed effect model Random effects model Heterogeneity: $f^2 = 98\%$, $\tau^2 = 0.5$ Incomplete Tetraplegia Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 | 73 117 308 148 56 53 11 741, <i>p</i> < 0 Events 1 39 53 | Fotal 496 262 1137 539 1694 307 216 75 4726 0.01 •otal 496 262 | | 0.15 0.45 0.27 0.27 0.7 0.18 0.25 0.15 0.21 0.20 Proportion 0.08 0.20 | [0.12; 0.18] [0.39; 0.51] [0.25; 0.30] [0.24; 0.31] [0.14; 0.23] [0.14; 0.23] [0.19; 0.31] [0.08; 0.25] [0.20; 0.23] [0.13; 0.30] 95%-CI [0.06; 0.11] [0.16; 0.26] | (fixed) 9.4% 9.8% 33.9% 16.2% 16.3% 6.9% 6.0% 1.4% 100.0% Weight (fixed) 7.4% 8.7% | (random) 12.7% 12.9% 12.8% 12.8% 12.6% 12.5% 11.0% Weight (random) 12.4% 12.5% |
| Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 1992 Alshahri at al. 2012 Alshahri SS et al. 2016 Quinones et al. 2002 Fixed effect model Random effects model Heterogeneity: $I^2 = 98\%$, $\tau^2 = 0.5$ Incomplete Tetraplegia Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 | 73 117 308 148 116 53 11 741, <i>p</i> < 0 Events 1 39 53 218 | Fotal 496 262 1137 539 1694 307 216 75 4726 0.01 • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • | | 0.15 0.45 0.27 0.27 0.7 0.18 0.25 0.15 0.21 0.20 Proportion 0.08 0.20 | [0.12; 0.18] [0.39; 0.51] [0.25; 0.30] [0.24; 0.31] [0.14; 0.23] [0.19; 0.31] [0.08; 0.25] [0.20; 0.23] [0.13; 0.30] 95%-CI [0.06; 0.11] | (fixed) 9.4% 9.8% 33.9% 16.2% 16.2% 6.9% 6.0% 1.4% 100.0% (fixed) 7.4% 8.7% 36.1% | (random) 12.7% 12.9% 12.8% 12.8% 12.6% 12.5% 11.0% Weight (random) 12.4% 12.5% 12.5% 12.9% |
| Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 1992 Alshahri at al. 2012 Alshahri SS et al. 2016 Quinones et al. 2002 Fixed effect model Random effects model Heterogeneity: $I^2 = 98\%$, $\tau^2 = 0.5$ Incomplete Tetraplegia Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 | 73 117 308 148 116 56 53 11 741, <i>p</i> < 0 Events 1 39 53 218 74 | Fotal 496 262 1137 539 1694 307 216 75 4726 0.01 •otal 496 262 1137 539 | | 0.15 0.45 0.27 0.27 0.18 0.25 0.15 0.21 0.20 Proportion 0.08 0.20 0.19 0.14 | [0.12; 0.18] [0.39; 0.51] [0.25; 0.30] [0.24; 0.31] [0.06; 0.08] [0.14; 0.23] [0.19; 0.31] [0.08; 0.25] [0.20; 0.23] [0.13; 0.30] 95%-Cl [0.06; 0.11] [0.16; 0.26] [0.17; 0.22] [0.11; 0.17] | (fixed) 9.4% 9.8% 33.9% 16.2% 16.3% 6.9% 6.0% 1.4% 100.0% | (random) 12.7% 12.7% 12.9% 12.8% 12.8% 12.6% 12.5% 11.0% |
| Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 1992 Alshahri at al. 2012 Alshahri SS et al. 2016 Quinones et al. 2002 Fixed effect model Random effects model Heterogeneity: $f^2 = 98\%$, $\tau^2 = 0.5$ Incomplete Tetraplegia Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 1992 | 73 117 308 148 16 56 53 11 741, <i>p</i> < 0 Events 1 39 53 218 74 74 54 | Fotal 496 262 1137 539 1694 307 216 75 4726 0.01 Fotal 496 262 137 539 1694 ■ | | 0.15 0.45 0.27 0.27 0.7 0.18 0.25 0.15 0.21 0.20 Proportion 0.08 0.20 0.19 0.14 0.03 | [0.12; 0.18] [0.39; 0.51] [0.25; 0.30] [0.24; 0.31] [0.06; 0.08] [0.14; 0.23] [0.19; 0.31] [0.08; 0.25] [0.20; 0.23] [0.20; 0.23] [0.20; 0.23] [0.06; 0.11] [0.16; 0.26] [0.17; 0.22] [0.11; 0.17] [0.02; 0.04] | (fixed) 9.4% 9.8% 33.9% 16.2% 16.3% 6.9% 6.0% 1.4% 100.0% Weight (fixed) 7.4% 8.7% 36.1% 13.1% 10.7% | (random) 12.7% 12.9% 12.8% 12.8% 12.6% 12.5% 11.0% Weight (random) 12.4% 12.5% 12.9% 12.9% 12.6% |
| Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 1992 Alshahri at al. 2012 Alshahri SS et al. 2016 Quinones et al. 2002 Fixed effect model Random effects model Heterogeneity: $I^2 = 98\%$, $\tau^2 = 0.5$ Incomplete Tetraplegia Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 1992 Alshahri at al. 2012 | 73 117 308 148 16 56 53 11 741, p < 0 Events 1 39 53 218 74 74 54 95 | Fotal 496 262 1137 539 1694 307 216 75 4726 0.01 496 262 137 539 694 307 | | 0.15 0.45 0.27 0.27 0.7 0.18 0.25 0.15 0.21 0.20 Proportion 0.08 0.20 0.19 0.14 0.03 0.31 | [0.12; 0.18] [0.39; 0.51] [0.25; 0.30] [0.24; 0.31] [0.06; 0.08] [0.14; 0.23] [0.19; 0.31] [0.08; 0.25] [0.20; 0.23] [0.20; 0.23] [0.13; 0.30] 95%-CI [0.16; 0.26] [0.17; 0.22] [0.11; 0.17] [0.02; 0.04] [0.26; 0.36] | (fixed) 9.4% 9.8% 33.9% 16.2% 16.2% 6.9% 6.9% 6.0% 1.4% 100.0% 7.4% 8.7% 36.1% 13.1% 10.7% 13.5% | (random) 12.7% 12.9% 12.8% 12.8% 12.6% 12.5% 11.0% Weight (random) 12.4% 12.5% 12.9% 12.7% |
| Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 1992 Alshahri at al. 2012 Alshahri SS et al. 2016 Quinones et al. 2002 Fixed effect model Random effects model Heterogeneity: $I^2 = 98\%$, $\tau^2 = 0.5$ Incomplete Tetraplegia Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 1992 Alshahri at al. 2012 | 73 117 308 148 16 56 53 11 741, $p < 0$ Events 7 39 53 218 74 74 54 74 | Fotal 496 262 1137 539 1694 307 216 75 4726 0.01 694 137 539 1694 307 216 | | 0.15 0.45 0.27 0.27 0.18 0.25 0.15 0.21 0.20 Proportion 0.08 0.20 0.19 0.14 0.31 0.22 | [0.12; 0.18] [0.39; 0.51] [0.25; 0.30] [0.24; 0.31] [0.06; 0.08] [0.14; 0.23] [0.19; 0.31] [0.08; 0.25] [0.20; 0.23] [0.13; 0.30] 95%-Cl [0.06; 0.11] [0.16; 0.26] [0.17; 0.22] [0.11; 0.17] [0.26; 0.36] [0.26; 0.28] | (fixed) 9.4% 9.8% 33.9% 16.2% 16.3% 6.9% 1.4% 100.0% Uveight (fixed) 7.4% 8.7% 8.7% 36.1% 13.1% 10.7% 13.5% 7.5% | (random) 12.7% 12.9% 12.8% 12.8% 12.6% 12.5% 11.0% |
| Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 1992 Alshahri at al. 2012 Alshahri SS et al. 2016 Quinones et al. 2002 Fixed effect model Random effects model Heterogeneity: $I^2 = 98\%$, $\tau^2 = 0.5$ Incomplete Tetraplegia Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 1992 Alshahri at al. 2012 | 73 117 308 148 16 56 53 11 741, p < 0 Events 1 39 53 218 74 74 54 95 | Fotal 496 262 1137 539 1694 307 216 75 4726 0.01 496 262 137 539 694 307 | | 0.15 0.45 0.27 0.27 0.18 0.25 0.15 0.21 0.20 Proportion 0.08 0.20 0.19 0.14 0.31 0.22 | [0.12; 0.18] [0.39; 0.51] [0.25; 0.30] [0.24; 0.31] [0.06; 0.08] [0.14; 0.23] [0.19; 0.31] [0.08; 0.25] [0.20; 0.23] [0.20; 0.23] [0.13; 0.30] 95%-CI [0.16; 0.26] [0.17; 0.22] [0.11; 0.17] [0.02; 0.04] [0.26; 0.36] | (fixed) 9.4% 9.8% 33.9% 16.2% 16.2% 6.9% 6.9% 6.0% 1.4% 100.0% 7.4% 8.7% 36.1% 13.1% 10.7% 13.5% | (random) 12.7% 12.9% 12.8% 12.8% 12.6% 12.5% 11.0% Weight (random) 12.4% 12.5% 12.9% 12.7% |
| Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 1992 Alshahri at al. 2012 Alshahri SS et al. 2016 Quinones et al. 2002 Fixed effect model Random effects model Heterogeneity: $I^2 = 98\%$, $\tau^2 = 0.5$ Incomplete Tetraplegia Rahimi-Movaghar et al. 2010 Tasoglu et al. 2016 Derakhshanrad et al. 2016 Gur et al. 2005 Dincer et al. 1992 Alshahri at al. 2012 Alshahri SS et al. 2016 Quinones et al. 2002 | 73 117 308 148 56 53 11 741, $p < 0$ Events 1 39 53 218 74 53 218 74 54 95 47 20 | Fotal 496 262 1137 539 1694 307 216 75 4726 0.01 539 496 262 137 539 694 307 216 75 307 216 75 | | 0.15 0.45 0.27 0.27 0.18 0.25 0.15 0.21 0.20 Proportion 0.08 0.20 0.19 0.14 0.03 0.31 0.22 0.27 | [0.12; 0.18] [0.39; 0.51] [0.25; 0.30] [0.24; 0.31] [0.06; 0.08] [0.14; 0.23] [0.19; 0.31] [0.20; 0.23] [0.20; 0.23] [0.20; 0.23] [0.13; 0.30] 95%-CI [0.16; 0.26] [0.17; 0.22] [0.16; 0.28] [0.16; 0.28] [0.17; 0.38] | (fixed) 9.4% 9.8% 33.9% 16.2% 16.3% 6.9% 6.0% 1.4% 100.0% Weight (fixed) 7.4% 8.7% 36.1% 10.7% 13.5% 7.5% 3.0% | (random) 12.7% 12.9% 12.8% 12.8% 12.6% 12.5% 11.0% |
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0.05 0.1 0.15 0.2 0.25 0.3 0.35

Fig. 5. A forest plot showing the pooled estimate of the type of injury

| Level: Cervical | Events | Total | | Proportion | 95%-CI | Weight (fixed) | Weight (random) |
|---|--|--|-----------------------------|--|--|---|--|
| Country = Egypt El Tallavy et al. 2013 Fixed effect model Random effects model Heterogeneity: not applicable | 3 | 6 6 | | 0.50 0.50 0.50 | [0.12; 0.88] [0.17; 0.83] [0.17; 0.83] | 0.2% 0.2% | 1.4% |
| Country = Iran Derakhshanrad et al. 2016 Fixed effect model Random effects model Heterogeneity: not applicable | 358 | 1137 1137 | \$ \$ \$ | 0.31 0.31 0.31 | [0.29; 0.34] [0.29; 0.34] [0.29; 0.34] | 30.0% 30.0% | 10.3% |
| Country = Jordan Otom et al. 1997 Fixed effect model Random effects model Heterogeneity: not applicable | 48 | 151 151 | | 0.32 0.32 0.32 | [0.24; 0.40] [0.25; 0.40] [0.25; 0.40] | 4.0% 4.0% | 8.2% |
| Country = Qatar Quinones et al. 2002 Fixed effect model Random effects model Heterogeneity: not applicable | 43 | 75 75 | | 0.57 0.57 0.57 | [0.45; 0.69] [0.46; 0.68] [0.46; 0.68] | 2.2% 2.2% | 7.0% |
| | 146 9 0 = 0.43 | 466 23 489 | ····+ | 0.31 0.39 0.32 0.32 | [0.27; 0.36] [0.20; 0.61] [0.28; 0.36] [0.28; 0.36] | 12.3% 0.7% 13.0% | 9.7% 3.9% 13.6% |
| Country = Turkey Tasogiu et al. 2016 Education et al. 2016 Erdogan et al. 2013 Karamehmetoglut et al. 1995 Atci et al. 2016 Karacan et al. 2010 Fixed effect model Random effects model Heterogeneity. / ² = 88%, t ² = 0. | 69 137 50 79 50 12 184 | 262 539 106 409 152 91 581 2140 | ∽₽≈₽≈₽≈₽≈₽ | 0.26 0.25 0.47 0.19 0.33 0.13 0.32 0.28 0.27 | [0.21; 0.32] [0.22; 0.29] [0.37; 0.57] [0.16; 0.23] [0.25; 0.41] [0.07; 0.22] [0.28; 0.36] [0.26; 0.30] [0.22; 0.34] | 6.2% 12.5% 3.2% 4.1% 1.3% 15.4% 50.6% | 9.0% 9.7% 7.8% 9.3% 8.3% 5.5% 5.5% |
| Fixed effect model Random effects model Heterogeneity: $l^2 = 86\%$, $\tau^2 = 0$. | | | ÷ * | 0.30 0.31 | [0.29; 0.32] [0.27; 0.36] | 100.0% | 100.0% |
| | vents Te | | 0.2 0.4 0.6 0.8 | Proportion | 95%-CI | Weight (fixed) | Weight (random) |
| ountry = Egypt El Tallawy et al. 2013 ixed effect model andom effects model eterogeneity: not applicable | 1 | 6 | | 0.17 0.17 0.17 | [0.00; 0.64] [0.02; 0.63] [0.02; 0.63] | 0.1% 0.1% | 3.0% 3.0% |
| ountry = Iran erakhshanrad et al. 2016 ixed effect model andom effects model eterogeneity: not applicable | 658 1 1 | 137 137 | * | 0.58 | [0.55; 0.61] [0.65; 0.61] [0.55; 0.61] | 39.1% 39.1% | 13.1% 13.1% |
| ountry = Saudi Arabia I-Jadid et al. 2013 I-Habib et al. 2014 ixed effect model andom effects model eterogeneity: / ² = 0%, τ ² = 0, <i>p</i> | 11 | 466 23 489 | | 0.48 | [0.44; 0.53] [0.27; 0.69] [0.44; 0.53] [0.44; 0.53] | 16.4% 0.8% 17.2% | 12.9% 8.9% 21.8% |
| iountry = Turkey asoglu et al. 2016 irdogan et al. 2013 tci et al. 2013 tci et al. 2013 tci et al. 2016 iracaan et al. 2000 ixed effect model andom effects model tetrogeneity: /² = 94%, r² = 0.7 | 37 120 56 156 | 262 106 409 91 581 449 | * | 0.35 0.29 0.62 0.27 0.34 | [0.40; 0.52] [0.26; 0.45] [0.25; 0.34] [0.51; 0.72] [0.23; 0.31] [0.32; 0.37] [0.29; 0.50] | 9.2% 3.4% 11.9% 3.0% 16.1% 43.6% | 12.7% 11.9% 12.8% 11.7% 12.9% |
| leterogeneity: $l^2 = 94\%$, $\tau^2 = 0.1$ fixed effect model Random effects model leterogeneity: $l^2 = 96\%$, $\tau^2 = 0.3$ | 3 | 081 | * | 0.46 0.42 | [0.44; 0.47] [0.32; 0.53] | 100.0% | 100.0% |
| leterogeneity: / ² = 96%, τ ² = 0.3 _evel: Lumbar/sacral | 3591, <i>p</i> ≺ Events | | 0.1 0.2 0.3 0.4 0.5 0.6 0.7 | Proportio | n 95%-0 | Weigh | nt Weigh d) (random |
| Country = Egypt El Tallawy et al. 2013 Tixed effect model Random effects model leterogeneity: not applicable | 2 | 6 6 | | - 0.3 0.3 0.3 | 3 [0.04; 0.7 3 [0.08; 0.7 3 [0.08; 0.7 | 3] 0.3 3] 0.3 | |
| country = Iran Derakhshanrad et al. 2016 Iixed effect model tandom effects model leterogeneity: not applicable | 121 | 1137 1137 | • | 0.1 0.1 0.1 | 1 [0.09; 0.13 1 [0.09; 0.13 1 [0.09; 0.13 | | % 10.9 % |
| ountry = Saudi Arabia I-Jadid et al. 2013 I-Habib et al. 2014 ixed effect model andom effects model eterogeneity: $J^2 = 84\%$, $\tau^2 = 0$. | 95 10 | 466 23 489 | * | 0.2 0.4 0.2 0.2 | 0 [0.17; 0.2 3 [0.23; 0.6 2 [0.18; 0.2 9 [0.12; 0.5 | 4] 14.49 3] 1.19 5] 15.59 5] - | % 9.09 |
| country = Turkey asoglu et al. 2016 rhan et al. 2005 rdogan et al. 2013 aramehmetoglul et al. 1995 tei et al. 2010 aracan et al. 2000 ixed effect model andom effects model eterogeneity: $l^2 = 96\%$, $r^2 = 0$. | | | → | 0.2 0.1 0.4 0.6 0.2 0.2 0.3 0.3 | 7 [0.59; 0.79 5 [0.17; 0.39 8 [0.24; 0.33 6 [0.34: 0.39 | 3] 10.09 0] 2.29 3] 19.59 5] 6.49 5] 3.39 2] 22.39 9] 63.69 7] - | % 9.99 % 10.99 % 10.79 % 10.39 % 10.39 |
| | 5096 p = | | 11 | | | | |

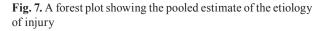


were found to be 51% (95% CI: 42-60%), 29% (95% CI: 23-36%), 10% (95% CI: 6-15%), 2% (95% CI: 1-4%) and 3% (95% CI: 2-4%) respectively (Figure 7). In addition, the pooled estimate for etiology by country showed that MVA were the leading cause of injury and then falls, except in Turkey were falls were the leading etiology (Figure 8). Moreover, based on a meta-regression model to investigate possible association between male gender and mean age, male gender was found to have no association with any cause of the injury. However, mean age was found to have association between MVA (p<0.0004), falls (p<0.0001) and sports (p<0.041).

Age Groups

The random pooled estimates for the age groups

| | | | | | | Weight | Weight |
|---|-----------------|-----------------|---------------------|------------|--|---------------|--------------|
| Etiology: MVA Country = Iran | Events | | 1: _ | Proportion | | (fixed) (r | |
| Derakhshanrad et al. 2016 Taghippor et al. 2015 | 703 34 | 1137 85 | ; = | | [0.59; 0.65] [0.30; 0.51] | 18.8% 1.4% | 5.2% 4.8% |
| Rahimi-Movaghar et al. 2009 Alhoseini et al. 2014 | 3 56 | 4 138 | | - 0.75 | [0.19; 0.99] [0.32; 0.49] | 0.1% | 1.7% 5.0% |
| Fixed effect model Random effects model Heterogeneity: $I^2 = 91\%$, $\tau^2 = 0.3$ | | 1364 | * | 0.58 | [0.32; 0.49] [0.56; 0.61] [0.34; 0.66] | 22.6% | 16.7% |
| Country = Jordan | 67 | 151 | | 0.44 | 10 20: 0 521 | 2.6% | 5.0% |
| Otom et al. 1997 Fixed effect model Random effects model | 67 | 151 | -00 | 0.44 | [0.36; 0.53] [0.37; 0.52] [0.37; 0.52] | 2.6% | 5.0% |
| Heterogeneity: not applicable Country = Kuwait | | | | | | | |
| Raibulet et al. 2001 Fixed effect model | 57 | 90 90 | | 0.63 | [0.53; 0.73] [0.53; 0.73] | 1.5% 1.5% | 4.8% |
| Random effects model Heterogeneity: not applicable | | | | 0.63 | [0.53; 0.73] | | 4.8% |
| Country = Qatar Quinones et al. 2002 Fixed effect model | 54 | 75 | | | [0.60; 0.82] | 1.1% 1.1% | 4.7% |
| Random effects model Heterogeneity: not applicable | | | \$ | 0.72 | [0.61; 0.81] | | 4.7% |
| Country = Saudi Arabia Al-Jadid et al. 2013 | 377 | 466 | - | 0.81 | [0.77; 0.84] | 5.0% | 5.1% |
| Al-Habib et al. 2014 Alshahri at al. 2012 | 13 262 | 23 307 | | | [0.34; 0.77] [0.81; 0.89] | 0.4% 2.7% | 4.1% 5.0% |
| Alshahri SS et al. 2016 | 196 | 216 1012 | ÷ | 0.91 | [0.86; 0.94] | 1.3% 9.4% | 4.8% |
| Fixed effect model Random effects model Heterogeneity: / ² = 86%, τ ² = 0.2 | 2238, p < | | Å | 0.82 | [0.81; 0.85] [0.73; 0.89] | J.4 70 | 18.9% |
| Country = Turkey Tasoglu et al. 2016 | 79 | 262 | | | [0.25; 0.36] | 3.9% | 5.0% |
| Gur et al. 2015 Erhan et al. 2005 | 200 43 | 539 106 | * : | 0.41 | [0.33; 0.41] [0.31; 0.51] | 8.8% 1.8% | 5.1% 4.9% |
| Erdogan et al. 2013 Karamehmetoglul et al. 1995 | 68 62 | 409 152 | * <u> </u> | | [0.13; 0.21] [0.33; 0.49] | 4.0% 2.6% | 5.1% 5.0% |
| Atci et al. 2016 Karamehmetoglul et al. 1997 | 34 19 | 91 75 | | 0.37 | | 1.5% 1.0% | 4.8% 4.7% |
| Dincer et al. 1992 | 600 | 1694 | | 0.35 | [0.33; 0.38] | 27.1% | 5.2% |
| Karacan et al. 2000 Cosar et al. 2010 | 286 70 | 581 127 | * | | [0.45; 0.53] [0.46; 0.64] | 10.2% 2.2% | 5.1% 4.9% |
| Fixed effect model Random effects model Heterogeneity: / ² = 93%, τ ² = 0.1 | 815. p < | 4036 0.01 | \$ | | [0.35; 0.38] [0.30; 0.43] | 62.9% | 49.9% |
| Fixed effect model Random effects model | | 6728 | * | | [0.46; 0.49] [0.42; 0.60] | 100.0% | |
| Heterogeneity: $l^2 = 98\%$, $\tau^2 = 0.6$ | 616, p < | 0.01 | 0.2 0.4 0.6 0.8 | 0.01 | [0.42, 0.00] | Weigh | |
| Etiology: Falls | Events | Total | | Proportio | on 95%- | Cl (fixed |) (random |
| Country = Iran Derakhshanrad et al. 2016 | | 1137 | ₩] | | 25 [0.22; 0.2 | | |
| Taghippor et al. 2015 Rahimi-Movaghar et al. 2009 | 32 1 | 85 4 | | | 38 [0.27; 0.4 25 [0.01; 0.8 | | |
| Alhoseini et al. 2014 | 63 | | ji | 0.4 | 46 [0.37; 0.5 | 4] 2.7% | 5.1% |
| Fixed effect model Random effects model Heterogeneity: $I^2 = 90\%$, $\tau^2 = 0.3$ | 013. <i>p</i> < | 1364 0.01 | * - | | 28 [0.25; 0.3 34 [0.22; 0.5 | | - 16.7% |
| Country = Jordan | | | | | | | |
| Otom et al. 1997 Fixed effect model | 32 | 151 151 | | | 21 [0.15; 0.2 21 [0.15; 0.2 | | |
| Random effects model Heterogeneity: not applicable | | 101 | \$ | | 21 [0.15; 0.2 | | - 5.0% |
| Country = Kuwait Raibulet et al. 2001 | 22 | 90 | | 0.5 | 24 [0.16; 0.3 | 5] 1.3% | 4.8% |
| Fixed effect model | ~~ | 90 | | 0.1 | 24 [0.17; 0.3 | 4] 1.3% | |
| Random effects model Heterogeneity: not applicable | | | 0 | 0.3 | 24 [0.17; 0.3 | 4] | - 4.8% |
| Country = Qatar Quinones et al. 2002 | 10 | 75 | į | 0.1 | 13 [0.07; 0.2 | 3] 0.7% | 4.3% |
| Fixed effect model | | 75 | | 0.1 | 13 [0.07; 0.2 | 3] 0.7% | |
| Heterogeneity: not applicable | | | ✓ | 0.1 | 13 [0.07; 0.2 | ~1 | 4.3% |
| Country = Saudi Arabia Al-Jadid et al. 2013 | 51 | | + ¦ | 0.1 | 11 [0.08; 0.1 | 4] 3.6% | |
| Al-Habib et al. 2014 Alshahri at al. 2012 | 8 28 | | + | 0.3 | 35 [0.16; 0.5 09 [0.06; 0.1 | 7] 0.4% | |
| Alshahri SS et al. 2016 | 28 | 216 | + 1 | 0.0 | 03 [0.01; 0.0 | 7] 0.5% | 6 4.1% |
| Fixed effect model Random effects model Heterogeneity: $l^2 = 87\%$, $\tau^2 = 0.4$ | 111 n - | 1012 | \$ | 0.1 | 10 [0.08; 0.1 11 [0.06; 0.1 | 2] 6.5% | - 18.0% |
| Country = Turkey | | | 2 2 2 | | | | |
| Tasoglu et al. 2016 Gur et al. 2015 | 90 172 | 262 539 | <u>년</u> | | 34 [0.29; 0.4 32 [0.28; 0.3 | | |
| Erhan et al. 2005 | 36 | 106 | | 0.3 | 34 [0.25; 0.4 | 4] 1.9% | 4.9% |
| Erdogan et al. 2013 Karamehmetoglul et al. 1995 | 292 65 | 409 152 | · · · · · | | 71 [0.67; 0.7 13 [0.35; 0.5 | | |
| Atci et al. 2016 | 54 | 91 | <u> </u> | 0.5 | 59 [0.49; 0.7 | 0] 1.7% | 4.9% |
| Karamehmetoglul et al. 1997 Dincer et al. 1992 | 28 500 | 75 1694 | | | 37 [0.26; 0.4 30 [0.27; 0.3 | 2] 27.7% | 5.4% |
| Karacan et al. 2000 Cosar et al. 2010 | 212 43 | | | 0.3 | 36 [0.33; 0.4 | 1] 10.6% | 5.3% |
| Fixed effect model | 43 | 4036 | • | 0.3 | 34 [0.26; 0.4 37 [0.35; 0.3 | 8] 68.7% | |
| Random effects model | | | \sim | 0.4 | 1 [0.32; 0.5 | 01 | - 51.2% |
| Heterogeneity: $I^2 = 96\%$, $\tau^2 = 0.3$ | 1435, p < | 0.01 | 1 | | | - 4 | |
| Heterogeneity: $I^2 = 96\%$, $\tau^2 = 0.3$ Fixed effect model | 1435, p < | 0.01 6728 | * | 0.3 | 32 [0.30; 0.3 | 3] 100.0% | |
| Heterogeneity: $I^2 = 96\%$, $\tau^2 = 0.3$ | | 6728 | 0.2 0.4 0.6 | 0.3 | | 3] 100.0% | |



0-9, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69 and \geq 70 were found to be 2% (95% CI: 1-4%), 10% (95% CI: 6-15%), 35% (95% CI: 28-43%), 22% (95% CI: 20-25%), 14% (95% CI: 11-18%), 7% (95% CI: 4-11%), 4% (95% CI: 2-8%) and 3% (95% CI: 1-5%) respectively (Figure 9).

| Etiology: Sports | Events Total | | Proportion | 95%-CI | Weight (fixed) (| Weight random) |
|---|---|---|--|--|--|--|
| Country = Iran Derakhshanrad et al. 2016 Fixed effect model Random effects model Heterogeneity: not applicable | 1137 | | 0.03 | [0.02; 0.04] [0.02; 0.04] [0.02; 0.04] | 37.9% 37.9% | 13.7% 13.7% |
| Country = Jordan Dom et al. 1997 Fixed effect model Random effects model Heterogeneity: not applicable | 4 151 - 151 - | | 0.03 | [0.01; 0.07] [0.01; 0.07] [0.01; 0.07] | 4.8% 4.8% | 9.1% 9.1% |
| Country = Saudi Arabia J–Jadid et al. 2013 Jshahri at al. 2012 Vixed effect model Random effects model leterogeneity: $l^2 = 0\%$, $\tau^2 = 0$ | 3 466 + 3 307 + 773 ¢ | | 0.01 | [0.00; 0.02] [0.00; 0.03] [0.00; 0.02] [0.00; 0.02] | 3.6% 3.6% 7.3% | 8.1% 8.1% 16.3% |
| Country = Turkey Fasoglu et al. 2016 Erhan et al. 2005 Erdogan et al. 2013 Atci et al. 2016 Garacan et al. 2010 Fixed effect model Random effects model Iderogeneity. /* 2 = 75%, r ² = | 5 262 - 11 106 14 409 2 91 - 7 581 → 4 127 - 1576 | · · · · · · · · · · · · · · · · · · · | - 0.10 0.03 0.02 0.01 0.03 0.03 | [0.01; 0.04] [0.05; 0.18] [0.02; 0.06] [0.00; 0.08] [0.00; 0.02] [0.01; 0.08] [0.03; 0.05] [0.02; 0.06] | 6.0% 12.0% 16.5% 2.4% 8.4% 4.7% 50.1% | 9.9% 11.9% 12.5% 6.6% 10.9% 9.1% 60.9% |
| Fixed effect model Random effects model Heterogeneity: $I^2 = 75\%$, $\tau^2 =$ | 3637 | \$ • | | [0.02; 0.03] [0.01; 0.04] | 100.0% | 100.0% |
| Etiology: Violence | Events Total | 0.05 0.1 0.15 | Proportio | n 95%-C | Weight I (fixed) | Weigh (random) |
| Country = Iran Derakhshanrad et al. 2016 Taghippor et al. 2015 Fixed effect model Random effects model Heterogeneity: $l^2 = 0\%$, $\tau^2 = 0$ | 2 85 1222 | φφ | 0.0 | 4 [0.03; 0.05 2 [0.00; 0.08 4 [0.03; 0.05 4 [0.03; 0.05 | 1.3% 28.6% | 12.5% 4.4% 16.9% |
| Country = Jordan Dtom et al. 1997 Fixed effect model Random effects model Heterogeneity: not applicable | 3 151 151 | | 0.0 | 2 [0.00; 0.06 2 [0.01; 0.06 2 [0.01; 0.06 | 1.9% | 5.7% |
| Country = Kuwait Raibulet et al. 2001 Fixed effect model Random effects model leterogeneity: not applicable | 2 90 90 | | 0.0 | 2 [0.00; 0.08 2 [0.01; 0.08 2 [0.01; 0.08 | 1.3% | 4.49 |
| Country = Saudi Arabia Al-Jadid et al. 2013 Alshahri SS et al. 2016 Fixed effect model Random effects model Heterogeneity: / ² = 91%, r ² = | 5 466 13 216 682 1.435 , p < 0.01 | | 0.0 | 1 [0.00; 0.02 6 [0.03; 0.10 4 [0.02; 0.06 3 [0.00; 0.13 | 8.1% 3 11.3% | 7.49 10.29 17.79 |
| Country = Turkey Tasoglu et al. 2016 Sure tal. 2005 Karamehmetoglui et al. 19: Aci et al. 2016 Karamehmetoglui et al. 19: Dincer et al. 1992 Karacan et al. 2000 Fixed effect model Random effects model Idetrogeneity: //2 = 78%, r ² = | 1 91 97 1 75 34 1694 19 581 3394 | \ | 0.0 0.0 0.0 0.0 0.0 0.0 0.0 | 2 [0.00; 0.06 1 [0.00; 0.06 | | 11.2% 9.9% 5.7% 2.6% 12.2% 12.2% |
| Fixed effect model Random effects model Heterogeneity: $l^2 = 71\%$, $\tau^2 =$ | 5539 0.2384, <i>p</i> < 0.01 | .:. ♦ | 0.0 | 3 [0.03; 0.04 3 [0.02; 0.04 | | 100.0% |
| Etiology: Gunshots | Events Total | 0.02 0.04 0.06 0.08 0.1 | Proportio | n 95%-0 | Weight (fixed) | |
| Country = Jordan Otom et al. 1997 Fixed effect model Random effects model Heterogeneity: not applicab | 39 151 151 | | 0.2 | 6 [0.19; 0.34 6 [0.19; 0.33 6 [0.19; 0.33 | 5.6% | 9.0% 9.0% |
| Country = Saudi Arabia Al-Jadid et al. 2013 Al-Habib et al. 2014 Alshahri at al. 2012 Fixed effect model Random effects model Heterogeneity: $l^2 = 0\%$, $\tau^2 =$ | 30 466 2 23 14 307 796 | + | 0.0 0.0 0.0 | 6 [0.04; 0.09 9 [0.01; 0.29 5 [0.03; 0.08 6 [0.04; 0.08 6 [0.04; 0.08 | 8] 0.4% 8] 2.6% 8] 8.3% | 9.0% 5.0% 8.5% 22.5% |
| Country = Turkey Tasoglu et al. 2016 Gur et al. 2005 Erhan et al. 2005 Karamehmetoglul et al. 1 Dincer et al. 1992 Karacan et al. 2000 | 17 262 115 539 10 106 995 8 152 997 22 75 372 1694 11 581 | + + + + + | 0.2 0.0 0.2 0.2 0.0 | 6 [0.04; 0.10 1 [0.18; 0.25 9 [0.05; 0.17 5 [0.02; 0.10 9 [0.19; 0.47 2 [0.20; 0.24 2 [0.01; 0.03 8 [0.04; 0.14 | 5] 17.4% 7] 1.7% 0] 1.5% 1] 3.0% 4] 55.7% 8] 2.1% | 8.69 9.49 8.19 7.89 8.69 9.59 8.39 8.19 |
| Cosar et al. 2010 Fixed effect model Random effects model Heterogeneity: $l^2 = 95\%, \tau^2$ | 10 127 3536 | * | 0.1 | 9 [0.18; 0.20 0 [0.06; 0.17 |] 86.1% | 68.4% |

Fig. 7. A forest plot showing the pooled estimate of the etiology of injury (continued)

Quality of the Included Studies

Sixteen studies were of good quality; six studies have score of 3, and ten studies have a score of 4. The remaining thirteen studies were of poor quality; having score ≤ 2 . Most studies achieved low score in both the clear definition of inclusion

and exclusion criteria and the qualifications of the person responsible for data collection. Also, many studies received low score in the category of security of the data repositories. Many studies either did not mention the form of the data source or did not mention the appropriateness of these data repositories.

Discussion

Spinal cord injury (SCI) negatively affect the patient's physical, social and psychological well-beings. Besides its paramount economic costs, SCI places profound burden on healthcare systems. In addition to the importance of epidemiological evidence to help in implementing effective prevention strategies, it will help physicians in managing cases with SCI. Because of lack of resources and limited number of rehabilitation centers across the MENA region, this knowledge is crucial [43, 44].

Based on this comprehensive meta-analysis, the annual incidence of SCI in the MENA region was found to be 23.24/million. 77% of SCI cases were estimated to be males. Mean age of all cases was estimated to be 31.32. The most affected age group was those aging 20-29 then those aging 30-39. Thoracic spinal region was the most affected. Complete paraplegia was the most common type of injury. Furthermore, MVA and falls were the leading causes of SCI. However, it is difficult to compares countries upon causes of SCI because of lack of standardization in defining the etiology of SCI. For example, different studies have different definition of MVA. Some studies consider hitting pedestrians as MVA whereas other studies considered them as different category. The same issue was found in defining sports, whether it include diving.

In addition, there is lack of evidence about SCI in most countries. Only seven countries out of the twenty-one MENA countries have published reports about the epidemiology of SCI. This may restrict the generalizability of this meta-analysis results across the region.

Also, most studies used a retrospective chart review of their records. In most studies, it is unclear whether the records came from a register or paper records.

Finally, this review, up to our knowledge, is the most comprehensive systematic review of published studies about the epidemiological patterns of SCI in the Middle-East and North-Africa region.

Conclusion

This review summarized evidence pertaining to the pattern of traumatic spinal cord injuries in the MENA region. It will help in implementing preventive measures and will help in managing patients with SCI. It will help healthcare systems

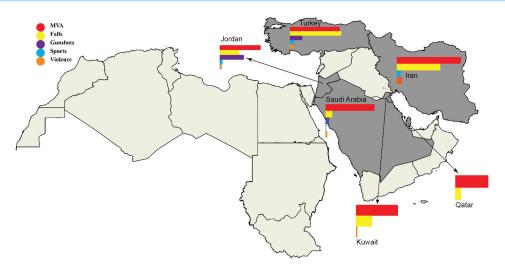


Fig. 8. Etiology of the spinal cord injury by country.

| Age: 0-9 Years | Events | Total | | Proportion | \ 95%-CI | Veight V (fixed) (ra | Veight |
|---|-----------------------|--------------------|---------------------|--------------|--|----------------------------|-----------------------------|
| Country = Iran | | | : 1 | | | | |
| Rahimi-Movaghar et al. 2010 Taghippor et al. 2015 Fixed effect model Random effects model Heterogeneity: I ² = 55%, r ² = 0.5 | 3 2 5233, p = 0 | 496 - 85 581 | | | [0.00; 0.02] [0.00; 0.08] [0.00; 0.02] [0.00; 0.04] | 3.9% 2.6% 6.5% | 13.3% 10.2% 23.4% |
| Country = Turkey | 5255, p - 0 | .15 | | | | | |
| Karamehmetodul et al. 1995 | 4 | 152 75 | | 0.03 | [0.01; 0.07] | 5.1% 2.6% | 15.4% 10.1% |
| Karamehmetoglul et al. 1997 Dincer et al. 1992 Karacan et al. 2000 | 58 9 | 1694 581 | | 0.03 | [0.00; 0.09] [0.03; 0.04] [0.01; 0.03] | 74.0% 11.7% | 29.5% 21.6% |
| | 9 | 2502 | \$ | 0.02 | [0.02; 0.04] [0.02; 0.04] | 93.5% | 76.6% |
| Random effects model Heterogeneity: $I^2 = 42\%$, $\tau^2 = 0.0$ | 0873, p = 0 | 0.16 | | 0.03 | [0.02; 0.04] | | 76.6% |
| Fixed effect model Random effects model Heterogeneity: $l^2 = 61\%$, $\tau^2 = 0.2$ | 2425. p = 0 | 3083 | - ¢ | 0.03 0.02 | [0.02; 0.04] 1 [0.01; 0.04] | | 00.0% |
| | Events | | 0.02 0.04 0.06 0.08 | Proportion | 95%-CI | Weight (fixed) (r | Weight andom) |
| Country = Iran Rahimi-Movaghar et al. 2010 | 33 | 496 | | 0.07 | [0.05; 0.09] | 5.7% | 11.7% |
| Derakhshanrad et al. 2016 Taghippor et al. 2015 | 76 | 1137 | | 0.07 | [0.05: 0.08] | 13.2% | 12.1% |
| | 10 | 85 1718 | <u>ه</u> | 0.12 | [0.06; 0.08] | 1.6% 20.6% | 10.3% |
| Random effects model Heterogeneity: $I^2 = 37\%$, $\tau^2 = 0.0$ | 0206, p = 0 | 0.21 | ۵ | 0.07 | [0.06; 0.09] | | 34.2% |
| Country = Saudi Arabia | | | | | | | |
| Al-Jadid et al. 2010 Fixed effect model | 55 | 495 495 | ~ | 0.11 | [0.08; 0.14] [0.09: 0.14] | 9.1% 9.1% | 12.0% |
| Fixed effect model Random effects model Heterogeneity: not applicable | | | \diamond | 0.11 | [0.09; 0.14] [0.09; 0.14] | | 12.0% |
| Country = Turkov | | | | | | | |
| Karamehmetoglul et al. 1995 Atci et al. 2016 Karamehmetoglul et al. 1997 Dincer et al. 1992 | 16 6 | 152 91 75 | | 0.11 | [0.06; 0.17] [0.02; 0.14] [0.02; 0.15] [0.21; 0.25] [0.08; 0.13] | 2.7% 1.0% 0.9% | 11.0% 9.4% 9.0% |
| Karamehmetoglul et al. 1997 Dincer et al. 1992 | 5 | 75 1694 | | 0.07 | [0.02; 0.15] | 0.9% 56.2% | 9.0% |
| Karacan et al. 2000 | | | | - 0.23 | [0.08; 0.13] | 9.6% 70.4% | 12.0% |
| Karacan et al. 2000 Fixed effect model Random effects model Heterogeneity: $I^2 = 94\%$, $\tau^2 = 0.5$ | | 2593 | | 0.20 | [0.18; 0.21] [0.06; 0.19] | 70.4% | 53.8% |
| Heterogeneity: <i>I</i> [*] = 94%, τ [*] = 0.5 Fixed effect model | | 4806 | | | [0.14; 0.16] | | |
| Fixed effect model Random effects model Heterogeneity: $l^2 = 96\%$, $\tau^2 = 0.5$ | | 4806 | <u> </u> | 0.15 | [0.14; 0.16] [0.06; 0.15] | 100.0% | 100.0% |
| Heterogeneity: /* = 96%, τ* = 0.5 Age: 20-29 Years | 5554, p < 0 | | | 25 | n 95%-C | Weight | Weight (random) |
| | | | 1.1 | Proportio | | | |
| Rahimi-Movaghar et al. 2010 Derakhshanrad et al. 2016 |) 133 646 | 496 1137 | | 0.2 - 0.5 | 7 [0.23; 0.31 |] 8.8%] 25.1% | 10.5% 10.8% |
| Taghippor et al. 2015 | 31 | 85 | | 0.3 | IG 10 26 0 48 | 1 1 8% | 9.2% |
| Country = Iran Rahimi-Movaghar et al. 2010 Derakhshanrad et al. 2016 Taghippor et al. 2015 Fixed effect model Random effects model Heterogeneity: I ² = 98%, v ² = 0. | 6908. p < | 0.01 | | 0.4 | 18 [0.46; 0.50 10 [0.20; 0.63 |] | 30.5% |
| Country = Jordan | | | | | | | |
| Otom at al. 1997 | 54 | 151 151 | | | 6 [0.28; 0.44 | | 9.9% |
| Fixed effect model Random effects model Heterogeneity: not applicable | | | - | 0.3 | 6 [0.29; 0.44 6 [0.29; 0.44 | i | 9.9% |
| Country = Saudi Arabia | | | | | | | |
| Al-Jadid et al. 2010 Fixed effect model | 198 | 495 495 | | 0.4 | 0 [0.36; 0.44 | 10.7% | 10.6% |
| Random effects model Heterogeneity: not applicable | | | \diamond | 0.4 | 10 [0.36; 0.44 10 [0.36; 0.44 | 1 | 10.6% |
| Country = Turkey | | | | | | | |
| Karamehmetoglul et al. 1995 Atci et al. 2016 Karamehmetoglul et al. 1997 | 54 18 | 152 | | 0.3 | 6 [0.28; 0.44 0 [0.12; 0.29 9 [0.28; 0.51 2 [0.30; 0.35 31 [0.27; 0.35 |] 3.1%] 1.3%] 1.6% | 9.9% 8.6% |
| Karamehmetoglul et al. 1997 Dincer et al. 1992 | 29 548 | 91 75 1694 | | 0.2 | 9 [0.28; 0.51 | 1 1.6% | 8.6% 9.0% 10.8% |
| Karacan et al. 2000 | 180 | 581 | - | 0.3 | 1 [0.27; 0.35 | 111.2% | 10.6% |
| Fixed effect model Random effects model Heterogeneity: $I^2 = 54\%$, $\tau^2 = 0$. | 0407 | 2593 | Š | 0.3 | 2 [0.30; 0.34 2 [0.28; 0.36 | | 49.0% |
| Fixed effect model | 0167, p = | 4957 | \$ | | 9 10 27: 0 40 | 1 100 0% | |
| Random effects model Heterogeneity: $I^2 = 96\%$, $\tau^2 = 0$. | 2588, p < | 0.01 | | 0.3 | 88 [0.37; 0.40 5 [0.28; 0.43 | 1 | 100.0% |
| Age: 30-39 | Events | | 0.2 0.3 0.4 0.5 | Proporti | on 95%- | Weight Cl (fixed) | Weight (random) |
| Country = Iran | 0 118 | 496 | 3 | - | 24 10 20:0 2 | 81 10.3% | 13.0% |
| Rahimi-Movaghar et al. 2010 Derakhshanrad et al. 2016 Taghippor et al. 2015 | 0 118 316 | 1137 | | 0. | 24 [0.20; 0.2 28 [0.25; 0.3 21 [0.13; 0.3 | B] 10.3% 0] 26.2% | 13.0% 16.1% 4.8% |
| Taghippor et al. 2015 Fixed effect model | 18 | 85 1718 | ~ | 0 . | | | |
| Fixed effect model Random effects model Heterogeneity: $I^2 = 51\%$, $\tau^2 = 0$. | .0136, p = | 0.13 | ~ | 0. | 25 [0.22; 0.2 | 9] | 34.0% |
| Country = Jordan | | | | | | | |
| Otom et al. 1997 Fixed effect model | 24 | 151 151 | | 0. | 16 [0.10; 0.2 16 [0.11; 0.2 | 3] 2.3% 3] 2.3% | 6.2% |
| Random effects model Heterogeneity: not applicable | | | | 0. | 16 [0.11; 0.2 16 [0.11; 0.2 | 3] | 6.2% |
| Country = Raudi Arabia | | | | | | | |
| Al-Jadid et al. 2010 Fixed effect model Random effects model | 98 | 495 495 | | 0. | 20 [0.16; 0.2 | 4] 9.0% | 12.4% |
| Random effects model Heterogeneity: not applicable | | +40 | | 0. | 20 [0.17; 0.2 20 [0.17; 0.2 | 4] | 12.4% |
| Country = Turkey | | | | | | | |
| | 35 | 152 91 | | 0. | 23 [0.17; 0.3 23 [0.15; 0.3 23 [0.14; 0.3 21 [0.19; 0.2 22 [0.19; 0.2 | 1] 3.1% | 7.5% |
| Karamehmetoglul et al. 1997 | 21 17 | 75 | | - 0. | 23 [0.15; 0.3 23 [0.14; 0.3 | 3] 1.9% 4] 1.5% | 5.3% 4.6% |
| Atci et al. 2016 Karamehmetoglul et al. 1997 Dincer et al. 1992 Karacan et al. 2000 | 360 127 | 1694 581 | | 0. | 21 [0.19; 0.2 22 [0.19; 0.2 | 3] 32.6% 5] 11.4% | 16.6% 13.4% |
| Fixed effect model Random effects model | | 2593 | 10 | 0. | 22 [0.20; 0.2 22 [0.20; 0.2 | 3] 50.5% | 47.4% |
| Heterogeneity: $I^2 = 0\%$, $\tau^2 = 0$, j | p = 0.97 | | <u></u> | 0. | | -4 | r== 70 |
| Fixed effect model | | 4957 | - \$ | 0. | 23 [0.22; 0.2 22 [0.20; 0.2 | 4] 100.0% | 100.0% |
| Random effects model Heterogeneity: $I^2 = 65\%$, $\tau^2 = 0$. | .0239, p < | 0.01 | | 0. | ∠∠ [U.20; 0.2 | ol | 100.0% |

 $\begin{array}{c|c} & & & \text{Readom effects model} \\ & & & \text{Heterogeneity}, f^2 = 65\%, t^2 = 0.0230, p < 0.01 \\ & & & \text{Intersection} \end{array} \end{array} \xrightarrow[0.15]{0.22} \begin{array}{c} 0.22 & [0.26]{0.25} & - & 100.0\% \\ \hline 0.15 & 0.2 & 0.25 & 0.3 \end{array}$

| Country = Iran Rahim-Moxphar et al. 2010 Derakhsharrad et al. 2016 Derakhsharrad et al. 2016 Takiper et al. 2015 Fixed effect model Random effects model Random effects model Random effects model Karamehmetoglul et al. 1995 Karamehmetoglul et al. 1995 Karamehmetoglul et al. 1997 Mano et al. 2006 Random effects model Heterogenehr / I ⁺ = 10%, I ⁺ = 0.0 Fixed effect model | 60 20 23 15 196 87 | 495 495 152 91 75 1694 581 2593 | * * * | 0.08 0.09 0.13 0.12 0.12 0.12 0.12 0.12 0.12 0.13 0.25 0.20 0.12 | (0.17; 0.25) (0.06; 0.09) (0.04; 0.18) (0.04; 0.18) (0.05; 0.25) (0.09; 0.15) (0.09; 0.15) (0.10; 0.15) (0.10; 0.15) (0.10; 0.15) (0.12; 0.31) (0.12; 0.31) | 15.9% 15.4% 1.4% 32.8% 10.2% 3.4% 3.3% 2.3% | 12.7% 12.7% 7.4% 32.8% 12.2% 12.2% |
|---|--|--|---|--|--|--|---|
| Taghippor et al. 2015 Fixed effect model Random effects model Alemogenety, <i>P</i> = 0.80, <i>R</i> = 0.6 Country = Saudi Arabia A-bade et al. 2010 Fixed effect model Heterogenety, <i>P</i> et applicable Country = Turkey Karanehmetogial et al. 1995 Karanehmetogial et al. 1997 Karaneh et al. 2000 Tunor et al. 1992 Karaceh et abel Random effects model Random effects model Random effects model Fixed effect model | 8 0008, p < 60 20 23 15 196 87 | 85 1718 0.01 495 495 152 91 75 1694 581 2593 | * + + + + + + + + + + + + + + + + + + + | 0.09 0.13 [0.12] 0.12] 0.12] 0.13] 0.13] 0.25] 0.20] 0.12] | (0.04; 0.18] 0.11; 0.15] 0.05; 0.25] (0.09; 0.15] 0.10; 0.15] 0.10; 0.15] (0.08; 0.20] (0.17; 0.35] (0.12; 0.31] | 1.4% 32.8% 10.2% 10.2% 3.4% 3.3% | 7.4% 32.8% 12.2% 12.2% |
| Fixed effect model Random effects model Heterogenety, <i>P</i> = 05%, <i>e</i> = 0.6 (country = 58udi Arabia Ar-Jadd et al. 2010 Random effects model Heterogenetiy: rot applicable Country = Turkey Karametmetoglui et al. 1997 Dinoer et al. 1992 Karde effects model Random effects model Random effects model Random effects model Random effects model Random effects model Random effects model | 2008, p < 60 20 23 15 196 87 | 1718 0.01 495 495 152 91 75 1694 581 2593 | • • • | 0.13 [0.12] 0.12] 0.12 [0.12] 0.12] 0.13] 0.25] 0.20] 0.12] | 0.11; 0.15] 0.05; 0.25] [0.09; 0.15] 0.10; 0.15] 0.10; 0.15] [0.08; 0.20] [0.17; 0.35] [0.12; 0.31] | 32.8% 10.2% 10.2% 3.4% 3.3% | |
| Random effects model Henrogeneki, Presolo, Henrogeneki, Presolo Country = Sandi Arabita Ar-Jadid et al. 2008. Di Rest effects model Henrogeneki, not applicable Country = Turkey Karanetmetogial et al. 1995 Alor et al. 2019. Dinorer et al. 1992 Karacen et al. 2009. Enced effect model Random effects model Random effects model Random effects model | 60 20 23 15 196 87 | 0.01 495 495 152 91 75 1694 581 2593 | | 0.12 0.12 0.12 0.12 0.13 0.25 0.20 0.12 | 0.05; 0.25] [0.09; 0.15] 0.10; 0.15] 0.10; 0.15] [0.08; 0.20] [0.17; 0.35] [0.12; 0.31] | 10.2% 3.4% 3.3% | 12.2% 12.2% |
| Country = Saudi Arabia Al-Jadid et al. 2010 Fixed effect model Random effects model Hetergomerky: net applicable Country = Turkey Karamehmetoglul et al. 1995 Nato et al. 2010 Dioner et al. 1992 Karada effect model Fixed effect model Fixed effect model Fixed effects model | 60 20 23 15 196 87 | 495 495 152 91 75 1694 581 2593 | • | 0.12 [0.12] 0.13 0.25 0.20 0.12 | 0.10; 0.15] 0.10; 0.15] [0.08; 0.20] [0.17; 0.35] [0.12; 0.31] | 10.2% 3.4% 3.3% | 12.2% |
| Fixed effect model Random effects model Heterogeneity: not applicable Country = Turkey Karamehmetogul et al. 1995 Atci et al. 2016 Karamehmetogul et al. 1997 Dincer et al. 1992 Karacan et al. 2000 Fixed effect model Heterogeneity: <i>I</i> ² = 79%, r ² = 0.0 Fixed effects model Random effects model | 20 23 15 196 87 | 495 152 91 75 1694 581 2593 | ++++++++++++++++++++++++++++++++++++++ | 0.12 [0.12] 0.13 0.25 0.20 0.12 | 0.10; 0.15] 0.10; 0.15] [0.08; 0.20] [0.17; 0.35] [0.12; 0.31] | 10.2% 3.4% 3.3% | 12.2% |
| Random effects model Heterogeneity: not applicable Country = Turkey Karamehmetoglul et al. 1995 Akia et al. 2016 Dincer et al. 1992 Karacan et al. 2000 Fixed effect model Random effects model Fixed offect model Fixed offect model | 23 15 196 87 | 91 75 1694 581 2593 | | 0.12 [0.13 0.25 0.20 0.12 | 0.10; 0.15] [0.08; 0.20] [0.17; 0.35] [0.12; 0.31] | 3.3% | 10.1% |
| Karamehmetoglui et al. 1995 Atoi et al. 2016 Karamehmetoglui et al. 1997 Dincer et al. 1992 Karacan et al. 2000 Fixed effect model Random effects model Heterogeneity: <i>I</i> ² = 79%, v ² = 0.0 Fixed effect model | 23 15 196 87 | 91 75 1694 581 2593 | | 0.20 | [0.12; 0.31] | 3.3% | |
| Atci et al. 2016 Karamehmetoglul et al. 1997 Dincer et al. 1992 Karacan et al. 2000 Fixed effect model Random effects model Heterogenety. <i>I</i> ² = 70%, τ ² = 0.0 Fixed effect model | 23 15 196 87 | 91 75 1694 581 2593 | | 0.20 | [0.12; 0.31] | 3.3% | |
| Dincer et al. 1992 Karacan et al. 2000 Fixed effect model Random effects model Heterogeneity: $l^2 = 79\%$, $\tau^2 = 0.0^\circ$ Fixed effect model Random effects model | 196 87 | 1694 581 2593 | | 0.20 | [0.12; 0.31] | 2 3% | |
| Karacan et al. 2000 Fixed effect model Random effects model Heterogeneity: $l^2 = 79%$, $\tau^2 = 0.0^{\circ}$ Fixed effect model Random effects model | 87 | 581 2593 | | | | 33.6% | 9.1% 13.2% |
| Fixed effect model Random effects model Heterogeneity: $l^2 = 79\%$, $\tau^2 = 0.0^{\circ}$ Fixed effect model Random effects model | 903, p < | | 6 | | [0.10; 0.13] [0.12; 0.18] | 33.6% | 13.2% |
| Heterogeneity: $l^2 = 79\%$, $\tau^2 = 0.0^\circ$ Fixed effect model Random effects model | 903, p < | | - | 0.13 [| 0.12; 0.15] 0.12; 0.20] | 57.0% | |
| Random effects model | | 0.01 | | 0.10 [| 0.12, 0.20] | | 00.070 |
| rundom enects model | | 4806 | | 0.13 | 0.12; 0.14] 0.11; 0.18] | 100.0% | |
| Heterogeneity: $l^2 = 90\%$, $\tau^2 = 0.1$ | 663, p < | 0.01 | 05 0.1 0.15 0.2 0.25 0.3 0.3 | | 0.11, 0.10] | Weight | Weight |
| | Events | Total | | Proportion | 95%-CI | (fixed) (I | |
| Country = Iran Derakhshanrad et al. 2016 | | 1137 - | - | | [0.01; 0.02] | 5.4% | 12.4% |
| Taghippor et al. 2015 | 11 | 85 1222 | ~ | 0.13 | [0.07; 0.22] [0.02; 0.05] | 4.0% 9.4% | 11.7% |
| Fixed effect model Random effects model | | - | ~ | 0.03 | [0.02; 0.05] [0. 80; 0.33] | 9.4% | 24.1% |
| Heterogeneity: $I^2 = 97\%$, $\tau^2 = 3.10$ | 69 , p < | 0.01 | | | | | |
| Country = Saudi Arabia Al-Jadid et al. 2010 | 31 | 495 | | 0.06 | [0.04: 0.09] | 12.1% | 13.7% |
| Fixed effect model | 01 | 495 | 0 | 0.06 | [0.04; 0.09] | 12.1% | |
| Random effects model Heterogeneity: not applicable | | | 4 | 0.06 | [0.04; 0.09] | | 13.7% |
| Country = Turkey Karamehmetoqlul et al. 1995 | 12 | 152 | | 0.09 | [0.04; 0.13] | 4.6% | 12.0% |
| Atci et al. 2016 | 12 | 91 | | 0.13 | [0.07; 0.22] | 4.3% | 11.9% |
| Karamehmetoglul et al. 1997 | 5 | 75 | <u> </u> | 0.07 | [0.02; 0.15] | 1.9% | 9.5% |
| Dincer et al. 1992 Karacan et al. 2000 | 110 67 | 1694 581 | | | [0.05; 0.08] | 42.9% 24.7% | 14.5% 14.3% |
| Fixed effect model | | 2593 | 0 | 0.08 | [0.07; 0.09] | 78.5% | 62.3% |
| Random effects model Heterogeneity: $I^2 = 78\%$, $\tau^2 = 0.1$: | 265, p < | 0.01 | | 0.09 | [0.06; 0.13] | | 62.3% |
| Fixed effect model Random effects model | | 4310 | | 0.07 0.07 | [0.07; 0.08] [0.04; 0.11] | 100.0% | 100.0% |
| Heterogeneity: $I^2 = 90\%$, $\tau^2 = 0.3$ | 778, p < | 0.01 | 0.05 0.1 0.15 0.2 | | | Weight | Weight |
| Age: 60-69 Years | Events | Total | 0.03 0.1 0.13 0.2 | Proportion | n 95%- | | (random) |
| Country = Saudi Arabia Al−Jadid et al. 2010 | 42 | 495 | | - 0.0 | B [0.06; 0.1 | 11 33.0% | 19.6% |
| Fixed effect model | 72 | 495 | \sim | 0.0 | B [0.06; 0.1 | 1] 33.0% | |
| Random effects model Heterogeneity: not applicable | | | \sim | 0.0 | 8 [0.06; 0.1 | 1] | 19.6% |
| Country = Turkey Karamehmetoglul et al. 1995 | 8 | 152 | | 0.0 | 5 [0.02; 0.1 | 01 6.5% | 16.7% |
| Atci et al. 2016 | 4 | 91 | | 0.0 | 4 [0.01; 0.1 | 1] 3.3% | 14.1% |
| Karamehmetoglul et al. 1997 | 2 | 75 | | 0.0 | 3 [0.00: 0.0 | 9] 1.7% | 10.8% |
| Dincer et al. 1992 Karacan et al. 2000 | 28 | 1694 581 | | 0.0 | 2 [0.01; 0.0 7 [0.05; 0.0 | 2] 23.6% 9] 32.0% | |
| Fixed effect model | | 2593 | \Leftrightarrow | 0.0 | 4 [0.03; 0.0 | 5] 67.0% | |
| | | | | 0.0 | 4 [0.02; 0.0 | 8] | 80.4% |
| Random effects model Heterogeneity: $I^2 = 89\%$, $\tau^2 = 0.6$ | 642, p < | 0.01 | 1.1 | | | | |
| Random effects model -leterogeneity: J ² = 89%, τ ² = 0.6 Fixed effect model | | 3088 | \$ | 0.0 | 5 [0.04; 0.0 | 6] 100.0% | |
| Random effects model -leterogeneity: $t^2 = 89\%$, $\tau^2 = 0.6$ | | 3088 | | 0.0 | 5 [0.04; 0.0 4 [0.02; 0.0 | 8] | 100.0% |
| Random effects model leterogeneity: $I^2 = 89\%$, $\tau^2 = 0.6$ Fixed effect model Random effects model leterogeneity: $I^2 = 91\%$, $\tau^2 = 0.5$ | | 3088 0.01 | 0.02 0.04 0.06 0.08 0.1 | 0.0 0.0 Proportio | 4 [0.02; 0.0 | 8] Weigh | 100.0% |
| Random effects model Heterogeneity: $I^2 = 85\%$, $\tau^2 = 0.6$ Fixed effect model Random effects model Heterogeneity: $I^2 = 91\%$, $\tau^2 = 0.5$ Age: 70 or more | 5706, p < Events | 3088 0.01 Total | | 0.0 Proportio | 4 [0.02; 0.0 n 95%– | 8] Weigh Cl (fixed | 100.0% t Weight) (random) |
| Random effects model Heterogeneity: i ² = 89%, i ² = 0.6 Fixed effect model Random effects model Heterogeneity: i ² = 91%, i ² = 0.5 Age: 70 or more Country = Saudi Arabia N-Jadid et al. 2010 Fixed effect model | 5706, p < | 3088 0.01 | | 0.0 Proportio 0.0 0.0 | 4 [0.02; 0.0 n 95%- 2 [0.01; 0.0 2 [0.01; 0.0 | 8] Weigh Cl (fixed 14] 35.9% | 100.0% t Weight) (random) 28.5% |
| Random effects model Heterogeneity: $l^2 = 69\%$, $t^2 = 0.6$ Fixed effect model Random effects model Heterogeneity: $l^2 = 91\%$, $t^2 = 0.5$ Age: 70 or more Country = Saudi Arabia V-Jadid et al. 2010 | 5706, p < Events | 3088 0.01 Total 495 | | 0.0 Proportio 0.0 0.0 | 4 [0.02; 0.0 n 95%- 2 [0.01; 0.0 | 8] Weigh Cl (fixed 14] 35.9% | 100.0% t Weight) (random) 28.5% |
| Random effects model leterogeneity, $I^2 = 89\%$, $\tau^2 = 0.8$ Random effects model Random effects model leterogeneity , $I^2 = 91\%$, $\tau^2 = 0.5$ Agge: 70 or more U Lounty = Saudi Arabia V -Jadid et al. 2010 Lounty = Lound Random effects model Random effects model Random effects model Random effects model Leterogeneity , not applicable Lounty = Turkey | 5706, p < Events 11 | 3088 0.01 Total 495 495 | | 0.0 Proportio 0.0 0.0 | 4 [0.02; 0.0 n 95%- 2 [0.01; 0.0 2 [0.01; 0.0 2 [0.01; 0.0 | 8] Weigh CI (fixed (4] 35.9% (4] 35.9% (4] | 100.0% t Weight) (random) 5 28.5% - 28.5% |
| Random effects model deterogeneity, r ² = 80%, r ² = 0.6 Kede effect model Random effects model Random effects model Random effects model Age: 70 or more Country : 9 audit Arabia Audit et al. 2010 House the model House the model | 5706, p < Events 11 | 3088 0.01 Total 495 495 | | 0.0 Proportio 0.0 0.0 0.0 | 4 [0.02; 0.0 n 95%- 2 [0.01; 0.0 2 [0.01; 0.0 2 [0.01; 0.0 2 [0.00; 0.0 | 8] Weigh CI (fixed (4] 35.9% (4] 35.9% (4] (6] 9.8% | 100.0% t Weight) (random) 5 28.5% - 28.5% |
| Random effects model leterogeneity, $l^2 = 0.8\%$, $t^2 = 0.8\%$ Random effects model leterogeneity, $l^2 = 01\%$, $t^2 = 0.1\%$ leterogeneity, $l^2 = 01\%$, $t^2 = 0.1\%$ leterogeneity, $l^2 = 01\%$, $t^2 = 0.1\%$ county = 5 audi Arabia V-Jadid et al. 2010 Leterogeneity, not applicable county = Turker model leterogeneity, not applicable County = Turker (1, 1995) Via et al. 2016 | 5706, p < Events 11 | 3088 0.01 Total 495 495 | | 0.0 Proportio 0.0 0.0 0.0 0.0 | 4 [0.02; 0.0 n 95%- 2 [0.01; 0.0 2 [0.01; 0.0 2 [0.01; 0.0 2 [0.00; 0.0 8 [0.03; 0.1 | 8] Weigh CI (fixed 14] 35.99 4] 35.99 4] 35.99 4] 16] 9.89 5] 21.59 | 100.0% t Weight) (random) 5 28.5% - 28.5% 5 18.4% 5 25.1% |
| Random effects model eleterogeneity: I ² = 89%, r ² = 0.8 Random effects model Random effects model eleterogeneity: I ² = 91%, r ² = 0.5 Age: 70 or more U Sounty = Studi Arabia V-Jadid et al. 2010 County = Studi Arabia V-adid et al. 2010 County = Studie County = Studie County = Studie County = Studie County = Studie State al. 2010 County = Studie State al. 2000 County = State al. 2000 | 5706, p < Events 11 3 7 10 | 3088 0.01 Total 495 495 495 152 91 581 824 | | 0.0 Proportio 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0. | 4 [0.02; 0.0 n 95%- 2 [0.01; 0.0 2 [0.01; 0.0 2 [0.01; 0.0 2 [0.01; 0.0 2 [0.00; 0.0 8 [0.03; 0.1 2 [0.03; 0.1 3 [0.02; 0.0 | B] Weigh (fixed (4] 35.9% (4] 35.9% (4] (6] 9.8% (5] 21.5% (5] 22.8% (5) 64.1% | 100.0% t Weight (random) 28.5% - 28.5% 18.4% 25.1% 28.0% |
| Random effects model deterogeneity, r ² = 80%, r ² = 0.6 Kade offect model Random effects model Random effects model Leicogeneity , r ² = 0.5 Age: 70 or more Lountry = Saudi Arabia Ar-Jadi de al. 2010 Kamehmengolul et al. 1995 Noi et al. 2010 Kamehmengolul et al. 1995 Noi et al. 2010 Kamean et al. 2000 | 5706, p < Events 11 3 7 10 | 3088 0.01 Total 495 495 495 152 91 581 824 | | 0.0 Proportio 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0. | 4 [0.02; 0.0 n 95%- 2 [0.01; 0.0 2 [0.01; 0.0 2 [0.01; 0.0 8 [0.03; 0.1 2 [0.01; 0.0 | B] Weigh (fixed (4] 35.9% (4] 35.9% (4] (6] 9.8% (5] 21.5% (5] 22.8% (5) 64.1% | 100.0% t Weight) (random) 5 28.5% - 28.5% 5 18.4% 5 25.1% 5 28.0% |
| Random effects model deterogeneity, i ² = 60%, i ² = 0.6 Kade offect model Random effects model deterogeneity, i ² = 05 Age: 70 or more Country = Saudi Arabia N-Jadid et al. 2010 Kraed effect model Handom effects model Kamehmengului et al. 1995 Noi et al. 2010 Gramehmengului et al. 1995 Noi et al. 2010 Gramehmengului et al. 1995 Noi et al. 2010 Kraena et al. 2000 Viked effects model leterogeneity, i ² = 80%, i ² = 0.8 | 5706, p < Events 11 3 7 10 | 3088 0.01 Total 495 495 495 152 91 581 824 | | 0.0. Proportio 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0. | 4 [0.02; 0.0 n 95%- 2 [0.01; 0.0 2 [0.01; 0.0 2 [0.01; 0.0 2 [0.00; 0.0 8 [0.03; 0.1 2 [0.01; 0.0 3 [0.02; 0.0 3 [0.01; 0.0 | B] Weigh Cl (fixed (4] 35.99 (4] 35.99 (4] 35.99 (4] (4] 35.99 (4] (4] 35.99 <li< td=""><td>100.0% t Weight (random) 5 28.5% 5 18.4% 5 18.4% 5 25.1% 5 28.5% 5 18.4% 5 71.5%</td></li<> | 100.0% t Weight (random) 5 28.5% 5 18.4% 5 18.4% 5 25.1% 5 28.5% 5 18.4% 5 71.5% |
| Random effects model eleterogeneity: I ² = 89%, r ² = 0.8 Random effects model Random effects model eleterogeneity: I ² = 91%, r ² = 0.5 Age: 70 or more U Sounty = Studi Arabia V-Jadid et al. 2010 County = Studi Arabia V-adid et al. 2010 County = Studie County = Studie County = Studie County = Studie County = Studie State al. 2010 County = Studie State al. 2000 County = State al. 2000 | 3706, p < Events 11 3 7 10 3955, p < | 3088 0.01 Total 495 495 152 91 581 824 0.01 1319 | | 0.0. Proportio 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0. | 4 [0.02; 0.0 n 95%- 2 [0.01; 0.0 2 [0.01; 0.0 2 [0.01; 0.0 2 [0.01; 0.0 2 [0.00; 0.0 8 [0.03; 0.1 2 [0.03; 0.1 3 [0.02; 0.0 | B] Weigh (fixed (fixed) 4] 35.99 4] 35.99 4] 4] 6] 9.89 5] 21.59 3] 32.89 5] 64.19 8] 4] 100.09 | 100.0% t Weight (random) 5 28.5% 5 18.4% 5 18.4% 5 25.1% 5 28.5% 5 18.4% 5 71.5% |

Fig. 9. A forest plot showing the pooled estimate of proportion of SCI cases by the age group. (continued)

in the MENA region in properly allocating resources to improve the care of patients with SCI.

Limitation

Lack of full data reporting and the limited number of available articles restrict the generalizability of the analysis results. Also, there is discrepancy in defining etiology of SCI. So, the data of this metaanalysis should be interpreted carefully.

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Recommendations

More studies in this field, especially from countries not included in this review, are needed. Large scale national studies are encouraged to ensure representativeness of the sample. Moreover, using more standardized definitions in reporting SCI epidemiological studies will help to solve discrepancy in the literature [45, 46].

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