Supplementary material I

1. Search strategy

**Table S1.** Search strategy performed in all databases, number of articles found in each search.

|  |  |  |
| --- | --- | --- |
| Database | Filters /restrictions | Nº of articles |
| Scopus | AT, A, K | 134 |
| **AT, A, K (2004-PRESENT)** | **96** |
| AT, A, K, English, Portuguese and Spanish (2004-PRESENT) | 80 |
| AT, A, K, German (2004-PRESENT) | **13** |
| PubMed | All PE words & Low back pain | 22 |
| **All PE words & Low back pain (2004 – Present)** | **20** |
| All PE words & Low back pain (2004 – Present), E,P&S | **18** |
| All PE words & Lower back pain | 33 |
| **All PE words & Lower back pain (2004 – Present)** | **30** |
| All PE words & Lower back pain (2004 – Present), E,P&S | 27 |
| All PE words & Lumbago | 22 |
| **All PE words & Lumbago (2004 – Present)** | **20** |
| All PE words & Lumbago (2004 – Present), E,P&S | 18 |
| All PE words & lumbar pain | 33 |
| **All PE words & lumbar pain (2004 – Present)** | **28** |
| All PE words & lumbar pain (2004 – Present), E,P&S | 25 |
| All PE words & dorsalgia | 72 |
| **All PE words & dorsalgia (2004 – Present)** | **67** |
| All PE words & dorsalgia (2004 – Present), E,P&S | 62 |
| All PE words &lower spine pain | 7 |
| **All PE words &lower spine pain (2004 – Present)** | **6** |
| All PE words &lower spine pain (2004 – Present), E,P&S | 5 |
| All PE words & spinal injur\* | 82 |
| **All PE words & spinal injur\*** | **58** |
| All PE words & spinal injur\* | 49 |
| All PE words & back pain | 72 |
| **All PE words & back pain** | **67** |
| All PE words & back pain | 62 |
| EBSCO | Txt | 246 |
| **Txt, 2004-2024** | **177** |
| Txt, English and spanish, 2004-2024 | 153 |
| Txt, English and spanish, 2004-2024, academic journals | 112 |
| Txt, German, 2004-2024, academic journals | **8** |

AT – Article title; A – Abstract; K – keywords; PE – Population and exposure keywords; E, P & S – language restrictions; Txt – Full text;

**Table S2.** Key words selected regarding population & exposure, and outcome of interest

|  |  |  |  |
| --- | --- | --- | --- |
| Population and exposure | Outcomes | Population and exposure (contin.) | Outcomes (contin.) |
| Horseback rider | Low back pain | Equestrian | Spinal injuries |
| Horseback riding | Lower back pain | Dressage | Back injuries |
| Equestrian athlete | Back pain | Eventing | Overuse injuries |
| Horse riding | Lumbar back pain | Showjumping |  |
| Horse rider | Lumbar pain |  |  |
| Equitation | Lumbar spine |  |  |

These keywords were combined using “OR” and “AND” operators to facilitate search (e.g. [“Equestrian” OR “Horse rider”] AND [“Lower back pain” OR “Overuse Injuries”])

1. Study details – Tables and content

**Table S3.** Summary of data items collected from included studies

|  |  |
| --- | --- |
| Categories | Items |
| Study characteristics | (1) Year of publication; (2) Study design; (3) Outcomes; (5) Statistical analysis; |
| Data collection | (1) Sources; (2) Country; (3) Tools and methods; (4) Injury categorization; (5) Riding discipline; |
| Sample details | (1) Sex; (2) Age; (3) Height; (4) Weight; (5) BMI; (6) Body fat percentage; (7) Riding level; (8) Competition level; (9) Skill level; (10) Time practicing sport; (11) Workload; (12) Equestrian related activities; |
| Pain details | (1) Anatomical location; (2) Nature; (3) Prevalence; (4) Incidence; (5) Number of occurrences; (6) Level of pain; (7) Pain management; (8) Time loss; (9) Level of disability. |
| Risk factors | (1) Risk factors; (2) Not risk factors; (3) Contributing factors; (4) Not contributing factors; |

**Figure S1.** Number of publications per period

**Table S4.** Study design features (n=14)

|  |  |  |
| --- | --- | --- |
| Design | Statistical analysis | References |
| Cross-sectional | Descriptive | \*Lewis et al. [31]  \*Pilato et al. [30] |
| Analytical | Duarte et al. [26]  \*Puszczałowska-Lizis et al. [32]  Ferrante et al. [27]  \*Lewis, Dumbell & Magnoni. [23]  \*Lewis & Baldwin. [21]  \*Lewis & Kennerley. [22]  \*Hobbs et al. [24]  Kraft et al. [25]  \*Kraft et al. [33] |
| Cohort | Analytical | Cejudo et al. [28]  Cejudo et al. [29] |
| Case control | Analytical | Deckers et al. [20] |

\*Papers that did specify study design

**Table S5.** Study outcomes (n=14)

|  |  |  |
| --- | --- | --- |
| Outcomes | N | References |
| Low back pain | 5 | Duarte et al. [26]; Ferrante et al. [27]; Cejudo et al. [28]; Cejudo et al. [29]; Kraft et al. [25]; |
| Back pain | 3 | Puszczałowska-lizis et al. [32]; Deckers et al. [20]; Kraft et al. [33]; |
| Equestrian related injury | 1 | Pilato et al. [30]; |
| Pain | 4 | Lewis et al. [31]; Lewis & Baldwin [21]; Lewis, Dumbell & Magnoni [23]; Lewis & Kennerley [22]; |
| Posture | 1 | Hobbs et al. [24]; |

**Table S6.** Sample details of included studies

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Reference | Country | Source (n) | Sample | Equestrian discipline | Age group |
| Duarte et al. [26] | PT | Equestrians of the Portuguese equestrian federation | - | Dressage  Show Jumping  General riding  Eventing  Endurance  Horseball  Working equitation | Adults |
| Lewis et al. [31] | GB | Equestrian population of UK | Leisure, amateur & professional | Dressage  Show jumping  Eventing  Hunting  Showing | Over 35 y.o. |
| Puszczałowska-lizis et al. [32] | PL | Equestrian centers | Amateur | Dressage  Show jumping  Hacking | 40-45 |
| Ferrante et al. [27] | IT | Members of Italian national equestrian federation | Competitive  Non-competitive | Dressage  Show jumping  Eventing  Country horse riding  Reining  Endurance  Vaulting  Driving  Other | Adults |
| Deckers et al. [20] | BE | Equestrian population of Belgium | Professional  National competition  Competitive level | Dressage  Show jumping  Eventing  Icelandic riding | 18-60 |
| Cejudo et al. [28] | ES | Murcia regional team | Competitive | Dressage  Show jumping | 12-17 |
| Cejudo et al. [29] | ES | Equestrian technical camps | Competitive | Dressage  Show jumping | 9-18 |
| Lewis & Baldwin. [21] | GB | Hartpury international horse trials | International (1\* to 3\*) | Eventing | 18-55 |
| Lewis, Dumbell & Magnoni. [23] | GB | Equestrians of the United Kingdom | Competitive  Professional  Amateur  Recreational | Show Jumping | Adults |
| Pilato et al. [30] | US | Intercollegiate equestrian team | Intercollegiate competitive level | English  Western  Eventing  Hunt  Dressage | Adults |
| Lewis & Kennerley [22] | GB | Hartpury festival of dressage | International (3\*) | Dressage | 19-52 |
| Hobbs et al. [24] | GB & US | British dressage camp & Michigan state university | Competitive | Dressage | Adults |
| Kraft et al. [25] | DE | National training camps | Elite | Dressage  Show jumping  Vaulting | 18-41 |
| Kraft et al. [33] | DE | Rhineland Equestrian sports association | Performance classes | Dressage  Show jumping  Vaulting | All |

**Table S7.** Data collection tools, dissemination procedure and sample size with details

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Reference | Tools (timeframe) | Recall period | Procedure | Participants (number, sex) |
| Duarte et al. [26] | Quest. (retrospective career) | One-year | Indirect (online) | N – 347 (M – 143; F – 204) |
| Lewis et al. [31] | Quest. (retrospective career) | Point | Indirect (online) | N – 2185 (M – 44; F – 2141) |
| Puszczałowska-lizis et al. [32] | Quest. (retrospective career) | Point | - | N – 88 (M – 44; F – 44) |
| Ferrante et al. [27] | Quest. (retrospective career) | Lifetime  One-year  Six-months  Three-months  One-month | Indirect (online) | N – 886 (M – 194; F – 692) |
| Deckers et al. [20] | Quest. (retrospective career)  Phys. Exam | Lifetime  Last month | Direct (each participant) | N – 32 (M – 10; F – 22) |
| Cejudo et al. [28] | Quest. (retrospective 12 mo.)  Phys. Exam | One-year | Direct (each participant) | N – 19 (M – 8; F – 11) |
| Cejudo et al. [29] | Quest. (retrospective career)  Phys. Exam | One year | Direct (each participant) | N – 43 (M – 15; F – 28) |
| Lewis & Baldwin. [21] | Quest. (retrospective career) | Point | Direct (each participant) | N – 31 (M – 13; F – 18) |
| Lewis, Dumbell & Magnoni. [23] | Quest. (retrospective career) | Point | Indirect (online) | N – 80 (M – 9; F – 71) |
| Pilato et al. [30] | Quest. (retrospective career) | Lifetime | Indirect (email) | N – 73 (M – 2; F – 71) |
| Lewis & Kennerley [22] | Quest. (retrospective career) | Point | Direct (each participant) | N – 50 (F – 50) |
| Hobbs et al. [24] | Quest. (retrospective career)  Kinematics | Point | Direct (each participant) | N – 127 (M - 1; F - 126) |
| Kraft et al. [25] | Quest. (retrospective career)  Phys. Exams  Clinical exams (retrospective) | Point | Direct (each participant) | N – 58 (M – 18; F – 40) |
| Kraft et al. [33] | Quest. (retrospective career) | Point | Indirect (online)  Direct | N – 508 (M – 187; F – 321) |

(\*) number of samples included for each variable was not consistent throughout the study.

**Table S8.** Detailed data collection tools of included studies.

|  |  |  |  |
| --- | --- | --- | --- |
| Reference | Questionnaire tools | Clinical examination tools | Others |
| Duarte et al. [26] | - Self designed questionnaire  - Roland Morris Disability questionnaire | - |  |
| Lewis et al. [31] | - Self designed questionnaire  - McGill Pain Questionnaire  - Oswestry Low Back Pain Disability Questionnaire | - |  |
| Puszczałowska-lizis et al. [32] | - Self designed questionnaire  - Neck Disability Index  - Oswestry Low Back Pain Disability Questionnaire | - |  |
| Ferrante et al. [27] | - Self designed questionnaire  - Standardized Nordic Questionnaires for the analysis of musculoskeletal symptoms  - Numeric rating scale  - Pain self-efficacy questionnaire | - |  |
| Deckers et al. [20] | - Self designed questionnaire  - Visual Analog Scale  - Oswestry Low Back Pain Disability Questionnaire | - Functional Movement screening tests  - Luomajoki’s Motor Control screening tool |  |
| Cejudo et al. [28] | - Self designed questionnaire | - Tanita-305 body fat analyzer  - Sagittal spinal curvatures  - ROM-SPORT battery  - Trunk muscle endurance |  |
| Cejudo et al. [29] | - Self designed questionnaire | - ROM-SPORT I Battery |  |
| Lewis & Baldwin. [21] | - Self designed questionnaire  - McGill Pain Questionnaire | - |  |
| Lewis, Dumbell & Magnoni. [23] | - Self designed questionnaire  - McGill Pain Questionnaire  - Oswestry Low Back Pain Disability Questionnaire | - |  |
| Pilato et al. [30] | - Self designed questionnaire | - |  |
| Lewis & Kennerley [22] | - Self designed questionnaire | - |  |
| Hobbs et al. [24] | - Self designed questionnaire | - Grip strength  - Trunk flexibility | - Images of standing posture  - Infra-red motion capture system |
| Kraft et al. [25] | - Self designed questionnaire  - Visual Analog Scale  - Oswestry Low Back Pain Disability Questionnaire | - Physical examinations  - Magnetic Resonance Imaging |  |
| Kraft et al. [33] | - Self designed questionnaire  - Visual Analog Scale | - |  |