2020 GLOBAL YEAR FOR THE PREVENTION OF PAIN

FACTSHEET

Prevention of Low Back Pain: The Importance of Intervention from an Early Age

Introduction

Chronic low back pain (LBP) is a global problem, impacting individuals and societies. The lifetime prevalence of low back pain is reported to be as high as 84%, and the prevalence of chronic low back pain is about 23%, with 11-12% of the population being disabled by low back pain[1]. Risk factors for the development of chronic back pain include genetic predisposition, lifestyle and occupational factors, and aging [25].

Although the prevention of LBP offers improvements in quality of life and years lived with disability, by contrast with evidence from a large number of trials that assess treatments for low back pain, evidence that assesses prevention, particularly primary prevention, is inadequate, and is largely derived from studies of adults in high-income societies. Whether guidelines derived from available studies are applicable to children, or implementable in low-income and middle-income countries, is not known[7].

People with osteoporosis, degenerative spondylosis, and vertebral canal stenosis often experience LBP. Identifying the specific sources of the pain, however, can be difficult because of the interaction of biological and psychosocial factors [11, 23].

Osteoporosis

Osteoporosis is defined by decreased bone density associated with an increased risk of fracture.

Over 50% of women develop osteoporosis by their 70s and approximately 17% of men develop osteoporosis by their 80s, with a lifetime risk of symptomatic vertebral fracture from age 60 of 18% for women and 11% for men [16, 24].

Osteoporosis can cause LBP, even in the absence of a defined fracture [17]. Osteoporotic fractures can cause acute pain, and result in spinal deformity (mainly kyphosis) and an increased risk of chronic pain. Although heritability accounts for 40-80% of the risk of developing osteoporosis, acquired factors, such as nutrition status, exercise habits, and medical disorders are modifiable factors associated with osteoporosis [12, 18].

Interventions

Early interventions are known to prevent the onset of osteoporosis. Ensuring the adequate dietary intake of calcium and vitamin D, and participating in sports such as gymnastics, volleyball, basketball, and softball, are effective in maximizing bone mass in those under the age of 18 years, and decrease the risk of fracture in later life [5, 15, 21, 22]. Continuing these interventions into middle age is also important for preserving bone mass and reducing fracture risk [2]. Care must be taken in older age

groups, however, because unaccustomed exercise may cause adverse effects such as increased pain due to muscle strains, joint injuries and fractures [13].

Degenerative spondylosis may be associated with spinal malalignment (eg. kyphosis) and instability, also known risk factors for developing LBP[4]. Correcting abnormal pelvic inclination, and improving spinal muscle strength and neural control, are thought to be important in preventing or reducing LBP, with exercises that improve alignment and core muscle strength, such training the low back and abdominal wall muscles, are reported as effective [9]. A combination of strengthening with either stretching or aerobic exercises performed 2–3 times per week can reasonably be recommended for prevention of LBP in the general population [19].

Exercise is also effective in preventing occupational LBP, either alone, or in combination with activity-specific education programs. Ergonomic interventions, such as lumbar supports, lifting devices, workplace modification, job rotation, and modifications to production systems, appear less effective than exercise [8, 10, 20].

Educational interventions alone do not appear to be effective in preventing LBP, in children [14], adults [6], or in the workplace[10]. Mass media campaigns designed to alter societal views about back pain and promote behavior change have now been performed in several countries with mixed results[3].

Conclusion

More research is needed to develop and implement effective, including cost-effective, strategies that prevent LBP and promote participation in physical and social activities.

In summary, LBP is a global problem that requires innovative approaches to develop and implement preventative strategies in order to reduce disability and improve quality of life. Improving nutrition and encouraging exercise currently appear to be the most effective strategies that can be implemented from an early age to prevent LBP.

REFERENCES

[1] Airaksinen O, Brox JI, Cedraschi C, Hildebrandt J, Klaber-Moffett J, Kovacs F, Mannion AF, Reis S, Staal J, Ursin H. Chapter 4 European guidelines for the management of chronic nonspecific low back pain. European spine journal 2006;15:s192-s300.
[2] Bradney M, Pearce G, Naughton G, Sullivan C, Bass S, Beck T, Carlson J, Seeman E. Moderate exercise during growth in prepubertal boys: changes in bone mass, size, volumetric density, and bone strength: a controlled prospective study. Journal of bone and mineral research : the official journal of the American Society for Bone and Mineral Research 1998;13(12):1814-1821.
[3] Buchbinder R, Gross DP, Werner EL, Hayden JA. Understanding the characteristics of effective mass media campaigns for back pain and methodological challenges in evaluating their effects. Spine 2008;33(1):74-80.
[4] Chaléat-Valayer E, Mac-Thiong J-M, Paquet J, Berthonnaud E, Siani F, Roussouly P. Sagittal spino-pelvic alignment in chronic low back pain. European spine journal 2011;20(5):634.
[5] De Laet C, Kanis J, Odén A, Johanson H, Johnell O, Delmas P, Eisman J, Kroger H, Fujiwara S, Garnero P. Body mass index as a predictor of fracture risk: a meta-analysis. Osteoporosis international 2005;16(11):1330-1338.
[6] Demoulin C, Marty M, Genevay S, Vanderthommen M, Mahieu G, Henrotin Y. Effectiveness of preventive back educational interventions for low back pain: a critical review of randomized controlled clinical trials. European Spine Journal 2012;21(12):2520-2530.
[7] Foster NE, Anema JR, Cherkin D, Chou R, Cohen SP, Gross DP, Ferreira PH, Fritz JM, Koes BW, Peul W. Prevention and treatment of low back pain: evidence, challenges, and promising directions. The Lancet 2018;391(10137):2368-2383.
[8] Hegewald J, Berge W, Heinrich P, Staudte R, Freiberg A, Scharfe J, Girbig M, Nienhaus A, Seidler A. Do Technical Aids for Patient Handling Prevent Musculoskeletal Complaints in Health Care Workers?—A Systematic Review of Intervention Studies. International journal of environmental research and public health 2018;15(3):476.

[9] Hodges PW. Core stability exercise in chronic low back pain. Orthopedic Clinics 2003;34(2):245-254.
[10] Huang R, Ning J, Chuter VH, Taylor JB, Christophe D, Meng Z, Xu Y, Jiang L. Exercise alone and exercise combined with education both prevent episodes of low back pain and related absenteeism: systematic review and network meta-analysis of randomised controlled trials (RCTs) aimed at preventing back pain. British journal of sports medicine 2019.
[11] Jacobs JM, Hammerman-Rozenberg R, Cohen A, Stessman J. Chronic back pain among the elderly: prevalence, associations, and predictors. Spine 2006;31(7):E203-E207.
[12] Kaufman J-M, Ostertag As, Saint-Pierre A, Cohen-Solal M, Boland A, Van Pottelbergh I, Toye K, de Vernejoul M-C, Martinez M. Genome-Wide Linkage Screen of Bone Mineral Density (BMD) in European Pedigrees Ascertained through a Male Relative with Low BMD Values: Evidence for Quantitative Trait Loci on 17q21–23, 11q12–13, 13q12–14, and 22q11. The Journal of Clinical Endocrinology & Metabolism 2008;93(10):3755-3762.
[13] Krein SL, Abdul-Wahab Y, Kadri R, Richardson CR. Adverse events experienced by participants in a back pain walking intervention: A descriptive study. Chronic illness 2016;12(1):71-80.
[14] Michaleff ZA, Kamper SJ, Maher CG, Evans R, Broderick C, Henschke N. Low back pain in children and adolescents: a systematic review and meta-analysis evaluating the effectiveness of conservative interventions. European Spine Journal 2014;23(10):2046-2058.
[15] Miyabara Y, Onoe Y, Harada A, Kuroda T, Sasaki S, Ohta H. Effect of physical activity and nutrition on bone mineral density in young Japanese women. Journal of bone and mineral metabolism 2007;25(6):414-418.
[16] Nguyen ND, Ahlborg HG, Center JR, Eisman JA, Nguyen TV. Residual lifetime risk of fractures in women and men. Journal of Bone and Mineral Research 2007;22(6):781-788.
[17] Ohtori S, Akazawa T, Murata Y, Kinoshita T, Yamashita M, Nakagawa K, Inoue G, Nakamura J, Orita S, Ochiai N, Kishida S, Takaso M, Eguchi Y, Yamauchi K, Suzuki M, Aoki Y, Takahashi K. Risedronate decreases bone resorption and improves low back pain in postmenopausal osteoporosis patients without vertebral fractures. Journal of clinical neuroscience : official journal of the Neurosurgical Society of Australasia 2010;17(2):209-213.
[18] Runyan SM, Stadler DD, Bainbridge CN, Miller SC, Moyer-Mileur LJ. Familial resemblance of bone mineralization, calcium intake, and physical activity in early-adolescent daughters, their mothers, and maternal grandmothers. Journal of the American Dietetic Association 2003;103(10):1320-1325.
[19] Shiri R, Coggon D, Falah-Hassani K. Exercise for the prevention of low back pain: systematic review and meta-analysis of controlled trials. American journal of epidemiology 2017;187(5):1093-1101.
[20] Steffens D, Maher CG, Pereira LS, Stevens ML, Oliveira VC, Chapple M, Teixeira-Salmela LF, Hancock MJ. Prevention of low back pain: a systematic review and meta-analysis. JAMA internal medicine 2016;176(2):199-208.
[21] Tanaka S, Kuroda T, Saito M, Shiraki M. Overweight/obesity and underweight are both risk factors for osteoporotic fractures at different sites in Japanese postmenopausal women. Osteoporosis International 2013;24(1):69-76.
[22] Tenforde AS, Carlson JL, Sainani KL, Chang AO, Kim JH, Golden NH, Fredericson M. Sport and triad risk factors influence bone mineral density in collegiate athletes. Medicine & Science in Sports & Exercise 2018;50(12):2536-2543.
[23] Williams JS, Ng N, Peltzer K, Yawson A, Biritwum R, Maximova T, Wu F, Arokiasamy P, Kowal P, Chatterji S. Risk factors and disability associated with low back pain in older adults in low-and middle-income countries. Results from the WHO study on global AGEing and adult health (SAGE). PLoS One 2015;10(6):e0127880.
[24] Willson T, Nelson SD, Newbold J, Nelson RE, LaFleur J. The clinical epidemiology of male osteoporosis: a review of the recent literature. Clinical epidemiology 2015;7:65.
[25] Wong AY, Karppinen J, Samartzis D. Low back pain in older adults: risk factors, management options and future directions. Scoliosis and spinal disorders 2017;12(1):14.

AUTHORS

Shuhei Nagai, MD
Multidisciplinary Pain Center, Aichi Medical University
Nagakute, Aichi, Japan

Takahiro Ushida, MD, PhD
Multidisciplinary Pain Center, Aichi Medical University
Nagakute, Aichi, Japan

Owen Williamson, FRCSC (Orthopedic Surgery & Pain Medicine)
Chronic Pain Clinic, Fraser Health Authority, Surrey, British Columbia, Canada

Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, Australia

REVIEWERS

Brona M. Fullen, PhD
Associate Professor
UCD School of Public Health
Physiotherapy and Sports Science
Dublin, Ireland

Professor Esther Pogatzki-Zahn, MD, PhD
Department of Anesthesiology, Intensive Care and Pain Medicine
University Hospital Muenster
Muenster, Germany

Seiji Ohtori, Dr. med.
Chiba University
Chiba, Japan