Changing concepts in approaches to occupational low back pain

With the lifetime prevalence of low back pain (LBP) in the Japanese population exceeding 80%², LBP is a major health problem and the leading cause of disability worldwide. It is one of the most common reasons people consult a physician, have activity limitations, or take time off work. The number of individuals with LBP is projected to increase in the future and even more rapidly in low-income and middle-income countries. Disability has the highest rate in working-age groups and is the most common cause of medically certified sick leave and early retirement. The onset can be work-related, and many workers with prolonged absences from work attribute their back pain to their work. Conversely, workers’ lost productivity includes absenteeism (productivity loss that stems from being absent from work) and presenteeism (productivity loss that stems from being at work while ill and performing at a lower level than usual). Among the costs related to workers’ health, lost productivity costs are significantly higher than medical and pharmacy costs and are, on average, 2.3 times higher. Several studies have demonstrated that costs incurred from presenteeism are much higher than those incurred from absenteeism and account for the largest proportion of the total health-related costs. LBP, along with neck and shoulder discomfort (Katakori), is also reportedly a primary cause of presenteeism in Japan.

Thus, the number of individuals with back pain and the loss of work continue to be significant, and looking at this situation from a bird’s eye view, it can be said that measures and interventions for LBP have been ineffective. Thus, can it be said that experts, including myself, are not producing successful results?

I would like to consider the reasons for this. LBP is a complex condition with pain and disability in different manifestations, which are influenced by various biological, psychological, and social factors. Many consider it a category of nonspecific LBP for which no specific cause can be established. We have reported in several prospective studies that not only ergonomic factors, but also psychosocial factors, including work-related factors such as job dissatisfaction and a lack of supervisor support, are the risk factors for both the occurrence and chronicity of nonspecific LBP that interferes with work, even among Japanese workers. However, there is a lack of standardization and provision of appropriate approaches to assessments that include psychological (called yellow flags) and social factors (called blue flags, including perceptions about the relationship between work and health), which is the main reason. One global standard screening tool for understanding potential personal psychological factors called yellow flags, such as pain catastrophizing, fear-avoidance beliefs (kinesiophobia), depression, and anxiety, is the Keele STarT Back Screening Tool (SBST). If prognostic factors are present or in case of a high-risk profile on the SBST, interventions should be considered to eliminate or reduce factors hindering work participation and to support beneficial factors. The use of SBST is recommended in the world’s first multidisciplinary occupational health guideline focused on effective interventions for work participation. If SBST has a high-risk profile, a mechanism needs to be established to share both the results and effective intervention methods with the clinicians and occupational health staff.

From a health and safety perspective, bias toward the work environment and ergonomic approaches may be a reason. Many stakeholders in occupational health and workers and patients still believe that back pain is mostly caused by mechanical pain with tissue damage due to back strain. Conversely, in 2017, the International Association for the Study of Pain announced that, in addition to the long-standing pain mechanism classification of nociceptive pain, including intervertebral disc injuries and neuropathic pain (e.g., lumbosacral radicular syndrome), nociplastic pain was officially adopted and announced as the third mechanistic descriptor. Nociplastic pain occurs even in the absence of tissue damage and is associated with various psychosocial factors. Thus, the pain created by the brain, which is distinct from the mind–body dualism, has finally become a civil right. Since it has already become clear that nociplastic pain with central sensitization is common in musculoskeletal disorders, such as LBP and osteoarthritis, there is a need to recognize nociplastic pain and de-
velop solutions for it in the field of occupational health. Candidate solutions or intervention packages may include approaches to fear-avoidance and pain behavior; exercise with a time-contingent approach; approaches to depression and sleep, which are mutually causal to LBP; and rehabilitation that also utilizes the mechanism of exercise-induced hypoalgesia. The WHO is developing disease-specific, priority evidence-based interventions, including those for LBP, and a package of interventions for rehabilitation that deliver them safely and effectively. All stakeholders in occupational health need to know that the only evidence-based intervention recommended for both recurrence prevention and chronic LBP relief is exercise. Needless to say, “staying active” is recommended for non-specific LBP, even if it is acute, to the extent that performing work can be preferred over rest.

Furthermore, attention should be paid to age management. Examples would include lifestyle approaches, including weight management, which is weak but associated with LBP relief for the working-age population, where disability due to LBP is common. Assessments and interventions for osteoporosis and sarcopenia, which are also associated with back pain and for which assessment and intervention methods are largely established, are essential for senior workers. These are investments in the prevention of long-term care after retirement. We should also be concerned about potential vitamin D deficiency in fair-skinned, thin women who work indoors with little exposure to sunlight and prevention of osteoporosis and sarcopenia. Hypovitaminosis D is related to back pain, its severity, and difficulty in performing daily activities, and vitamin D supplementation for chronic pain with vitamin D deficiency improves sleep and quality of life, as well as pain relief.

Based on the above, future research is warranted in the area of effective interventions for LBP with disability, including work-related outcomes such as presenteeism and work engagement. Cost-effectiveness studies for interventions with work-related outcomes in this field is currently lacking, and it will be necessary to clarify the role of the factor of “medical costs” (resource allocation) in the future.

Furthermore, a strategy that considers the advent of the digital healthcare era is essential. We have confirmed that offering short exercises, including “One Stretch”, which has been proven to prevent and improve LBP in workers, as the AI-assisted health program via SNS on workers can increase adherence to exercises and help improve symptoms. In the future, it will be necessary to develop Just-in-Time Adaptive Intervention using IoT and metaverse in this area.

As the way of working is changing due to the pandemic, it is desirable to establish an individualized population approach based on the rational and strategic assessment of LBP, which is a common disease with the highest disability impact and is frequently recurrent, to help workers improve their self-management and self-efficacy, maintain constant work participation and moderate physical activity, and improve productivity. This requires further interdisciplinary and international collaborations. As a prerequisite for this, we consider that all stakeholders involved in back pain management need to promote acceptance and sharing of “conceptual change”.

References

1) Fujii T, Matsuda K (2013) Prevalence of low back pain and factors associated with chronic disabling back pain in Japan. Eur Spine J 22, 432–8.
2) GBD (2018) Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet 392, 1789–858.
3) Hoy D, March L, Brooks P, Blyth F, Woolf A, Bain C, Williams G, Smith E, Yos T, Barendregt J, Murray C, Burstein R, Buchbinder R (2014) The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. Ann Rheum Dis 73, 968–74.
4) Hartvigsen J, Hancock MJ, Kongsted A, Louw Q, Ferreira ML, Genevay S, Hoy D, Karppinen J, Pransky G, Sieper J, Smeets RJ, Underwood M, Lancet Low Back Pain Series Working Group (2018) What low back pain is and why we need to pay attention. Lancet 391, 2356–67.
5) Miedema HS, van der Molen HF, Kuijper PP, Koes BW, Burdorf A (2014) Incidence of low back pain related occupational diseases in the Netherlands. Eur J Pain 18, 873–82.
6) Bakuhyus-Roozeboom M, Gouw P, Hooftman W, Houtman I, Klein Hesselink J (2008) Arbobalans 2007/2008: Quality of labor, effects and measurements in the Netherlands (Kwaliteit van arbeid, effecten en maatregelen in Nederland). Hoofddorp: TNO Quality of life (Kwaliteit van leven).
7) Loeppke R, Taitel M, Haufle V, Parry T, Kessler RC, Jinnett K (2009) Health and productivity as a business strategy: a multiemployer study. J Occup Environ Med 51, 411–28.
8) Hemp P (2004) Presenteeism: at work--but out of it. Harv Bus Rev 82, 49–58.
9) Collins JJ, Baase CM, Sharda CE, Ozminkowski RJ, Nicholson S, Billotti GM, Turpin RS, Olson M, Berger ML (2005) The assessment of chronic health conditions on work performance, absence, and total economic impact for employers. J Occup Environ Med 47, 547–57.
10) Goetzel RZ, Long SR, Ozminkowski RJ, Hawkins K, Wang S, Lynch W (2004) Health, absence, disability, and presenteeism cost estimates of certain physical and mental health conditions affecting U.S. employers. J Occup Environ Med 46, 398–412.

11) Iverson D, Lewis KL, Caputi P, Knospe S (2010) The cumulative impact and associated costs of multiple health conditions on employee productivity. J Occup Environ Med 52, 1206–11.

12) Wada K, Arakida M, Watanabe R, Negishi M, Sato J, Tsutsumi A (2013) The economic impact of loss of performance due to absenteeism and presenteeism caused by depressive symptoms and comorbid health conditions among Japanese workers. Ind Health 51, 482–9.

13) Nagata T, Mori K, Ohtani M, Nagata M, Kajiki S, Fujino Y, Matsuda S, Loepkke R (2018) Total health-related costs due to absenteeism, presenteeism, and medical and pharmaceutical expenses in Japanese employers. J Occup Environ Med 60, e273–80.

14) Yoshimoto T, Oka H, Fujii T, Nagata T, Matsuda K (2020) The economic burden of lost productivity due to presenteeism caused by health conditions among workers in Japan. J Occup Environ Med 62, 883–8.

15) Matsuda K, Konishi H, Miyoshi K, Isomura T, Takeshita K, Hara N, Yamada K, Machida H (2012) Potential risk factors for new onset of back pain disability in Japanese workers: findings from the Japan epidemiological research of occupation-related back pain study. Spine 37, 1324–33.

16) Matsuda K, Konishi H, Miyoshi K, Isomura T, Inuzuka K (2014) Potential risk factors of persistent low back pain developing from mild low back pain in urban Japanese workers. PLoS One 9, e93924.

17) Matsuda K, Kawaguchi M, Isomura T, Inuzuka K, Koga T, Miyoshi K, Konishi H (2015) Assessment of psychosocial risk factors for the development of non-specific chronic disabling low back pain in Japanese workers – findings from the Japan epidemiological research of Occupation-related Back pain (JOB) study. Ind Health 53, 368–77.

18) Kawaguchi M, Matsuda K, Sawada T, Koga T, Ishizuka A, Isomura T, Coggon D (2017) Assessment of potential risk factors for new onset disabling low back pain in Japanese workers: findings from the CUPID (cultural and psychosocial influences on disability) study. BMC Musculoskelet Disord 18, 334.

19) Matsuda K, Takahashi M, Kawaguchi M, Hamaguchi A, Haga Y, Koga T (2019) Assessment of risk factors for non-specific chronic disabling low back pain in Japanese workers-findings from the CUPID (Cultural and Psychosocial Influences on Disability) study. Ind Health 57, 503–10.

20) Hill JC, Dunn KM, Lewis M, Mullis R, Main CJ, Foster NE, Hay EM (2008) A primary care back pain screening tool: identifying patient subgroups for initial treatment. Arthritis Rheum 59, 632–41.

21) Matsuda K, Oka H, Kikuchi N, Haga Y, Sawada T, Tanaka S (2016) Psychometric properties of the Japanese version of the STarT Back tool in patients with low back pain. PLoS One 11, e0152019.

22) Hill JC, Whitehurst DGT, Lewis M, Bryan S, Dunn KM, Foster NE, Konstantinou K, Main CJ, Mason E, Somerville S, Sowden G, Vohora K, Hay EM (2011) Comparison of stratified primary care management for low back pain with current best practice (STarT Back): a randomised controlled trial. Lancet 378, 1560–71.

23) Luites JWH, Kuijer PPFM, Hulshof CTJ, Kok R, Langendam MW, Oosterhuis T, Anema JR, Lapré-Utama VP, Everaert CPJ, Wind H, Smeets RJEM, van Zaanen Y, Hoenink EA, Vooft L, de Hoop W, Boerman DH, Hoving JL (2021) The Dutch multidisciplinary occupational health guideline to enhance work participation among low back pain and lumbar sacral radicular syndrome patients. J Occup Rehabil, Jul 27. Online ahead of print.

24) Fitzcharles MA, Cohen SP, Clauw DJ, Littlejohn G, Usui C, Häuser W (2021) Nociceptive pain: towards an understanding of prevalent pain conditions. Lancet 397, 2098–110.

25) Nijs J, George SZ, Clauw DJ, Fernández-de-las-Peñas C, Kosek E, Ickmans K, Fernández-Camero J, Polli A, Kapreli E, Huysmans E, Cuesta-Vargas AI, Mani R, Lundberg M, Leysen L, Rice D, Sterling M, Curatolo M (2021) Central sensitisation in chronic pain conditions: latest discoveries and their potential for precision medicine. Lancet Rheumatol 3, e383–92.

26) Ho KKN, Ferreira PH, Pinheiro MB, Aquino Silva D, Miller CB, Grunstein R, Simic M (2019) Sleep interventions for osteoarthritis and spinal pain: a systematic review and meta-analysis of randomized controlled trials. Osteoarthritis Cartilage 27, 196–218.

27) Matsuda K, Hara N, Arisaka M, Isomura T (2011) Comparison of physician’s advice for non-specific acute low back pain in Japanese workers: advice to rest versus advice to stay active. Ind Health 49, 203–8.

28) e Silva AV, Lacatiga PG, Russo LA, de Gregório LH, Pinheiro RA, Marinheiro LP (2013) Association of back pain with hypovitaminosis D in postmenopausal women with low bone mass. BMC Musculoskeletal Disord 14, 184.

29) Huang W, Shah S, Long Q, Crankshaw AK, Tangprichaet V (2013) Improvement of pain, sleep, and quality of life in chronic pain patients with vitamin D supplementation. Clin J Pain 29, 341–7.

30) Oka H, Nomura T, Asada F, Takano K, Nitta Y, Uchima Y, Sato T, Kawase M, Sawada S, Sakamoto K, Yasue M, Arima S, Katsuhira J, Kawamata K, Fujii T, Tanaka S, Konishi H, Okazaki H, Miyoshi K, Watanabe J, Matsuda K (2019) The effect of the “One Stretch” exercise on the improvement of prevalent pain conditions. Lancet 397, e383–92.

31) Anan T, Kajiki S, Oka H, Fujii T, Kawamata K, Mori K, Matsuraira K (2021) Effects of an artificial intelligence-assisted health program on workers with neck/shoulder pain/stiffness and low back pain: randomized controlled
32) Itoh N, Mishima H, Yoshida Y, Yoshida M, Oka H, Matsudaira K (2022) Evaluation of the effect of patient education and strengthening exercise therapy using a mobile messaging app on work productivity in Japanese patients with chronic low back pain: open-label, randomized, parallel-group trial. JMIR Mhealth Uhealth 9, e27535.

33) Buchbinder R, van Tulder M, Öberg B, Costa LM, Woolf A, Schoene M, Croft P; Lancet Low Back Pain Series Working Group (2018) Low back pain: a call for action Lancet 391, 2384–8.

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