Do Medical, Dental, and Pharmacy students believe the back pain myths?

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Glossary

BDNF – brain-derived neurotropic factor

BPQ – back pain questionnaire

CNS – central nervous system

CRPS – complex regional pain syndrome

DALY – disability-adjusted life years

IASP – International Association for the Study of Pain

LBP – low back pain

NICE – national institute for health and care excellence

NSAIDS – nonsteroidal anti-inflammatory drugs

RCT – randomized controlled trial

USSM – university of split school of medicine

YLD – years lived with disability

1. INTRODUCTION

1.1. Pain Definition, Classification, Mechanism

Pain is defined as “an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage” by the International Association for the Study of Pain, (IASP) (1).

Acute pain is defined in terms of time, usually less than three months in duration (2,3). Back pain can be more specifically classified into four categories as acute (0-6 weeks), subacute (6-12 weeks), chronic (>12 weeks), and recurrent (2,3). Acute pain is elicited by tissue injury in response to physical injury or disease, and is perceived in response to activation of nociceptive transducers at the site of local tissue damage (4). Acute pain usually resolves within an expected, predictable time period of healing (5).

Like acute pain, chronic pain is diagnosed according to time, generally considered to be longer than three months (2,3,5). Chronic pain is often triggered by an injury or disease, as in acute pain, however it may also be perpetuated by other biopsychosocial factors (4). Chronic pain may result in complex regional pain syndrome (CRPS) where the pain is out of proportion to the initial pathological process, or it may exist without any sign of injury (4). It is currently believed that there is a general lack of experienced professionals suitably trained to manage chronic pain, and underreporting of its significance in clinical practice has remained an issue (6).

1.1.1. Pain Perception

The unpleasant sensation of pain is mediated by specialized sensory neurons, termed nociceptors, that alert us to potentially harmful stimuli by transducing peripheral stimuli to the thalamus and mesencephalon and other higher centers of the brain, creating the sensory-discriminative and affective-cognitive features of pain. Nociceptors are primary somatosensory neurons that serve as bifurcate free nerve endings that travel from the periphery to enter the spinal cord at the apex of the dorsal horn of the central nervous system (CNS). They then divide, ascend, and descend for one to three segments along the dorsal horn. The experience of nociceptive pain occurs along a pathway consisting of the phases of transduction, conduction, transmission, modulation, and perception; beginning when the major pain-conducting fibers, Aδ and C fibers, are stimulated indirectly by released chemicals and enzymes from damaged cells and tissue (7). The increased firing frequency of afferent nociceptive fibers is recognized as pain, which is then

transmitted as afferent information from the periphery to higher centres of the brain, the muscles, and the viscera. Aβ fibers may transduce nociceptive signals the when inflammation occurs or in certain disease states, sending sharp, highly localized pain (7). Noxious stimuli cause inflammatory changes which then lead to lowering of the activation threshold, resulting in peripheral sensitization, which is termed acute pain, and causes the peripheral neurons to become more sensitive to weak stimuli (8). The pain stimulus is then processed, causing the individual experience the perception of pain which leads to central sensitization, with the potential to cause the development of chronic pain (9).

The nucleus raphe magnus located in the medulla of the CNS includes a number of serotonergic neurons which descend all levels of the spinal cord and synapse on enkephalin-containing interneurons, an endogenous opioid peptide, located in the dorsal horn of the spinal cord in the descending pathway of pain (10,11). In addition to the medulla, mu opioid receptors associated with the descending pain pathway are located in two other areas of the cortex, the periaqueductal grey matter of the midbrain, and the dorsal horn of the spinal cord (11). Stimulation of the descending serotonergic pathway causes release of enkephalins which inhibit nociceptive release of neurotransmitter from the dorsal root ganglion neurons as well as the second order spinothalamic dorsal horn neurons, producing an analgesic effect contributing to pain modulation. The neurotransmitters modulated by stimulation of the enkephalinergic interneurons within the medulla are believed to be glutamate and substance P (10,12). Enkephalins released by the dorsal horn interneurons act on the opiate receptors of the nociceptive neurons in the dorsal root ganglia, reducing calcium entry into the terminal in order to inhibit the release of neurotransmitters (10). The recommendation of early ambulation and continuous movement for back pain sufferers is based on the fact that activation of larger muscle groups increases the production of enkephalins (13).

1.1.2. Chronic Pain: Classification & Mechanism

In contrast to acute pain and the process of peripheral sensitization, the development of chronic pain results from the processes of central sensitization and neuroplasticity. When nerve fibers are exposed to intense, repeated, and sustained noxious stimuli, central sensitization is elicited, which results in changes to glutamate receptors and various signalling pathways such as

those involving substance P, and brain-derived neurotropic factor (BDNF) (8). Neuroplasticity is an adaptive process and refers to the dynamic nature of the nervous system and the functional and structural changes made by the brain that occur as a result of different types and frequency of stimuli (8). This adaptive process in response to environmental, physiological, and disease states may result in changes to the number and type of receptors on a neuron, firing rates, the number of synaptic connections, as well as the rate of new neuron development. Neuroplasticity has been linked to the emergence of chronic pain, and one such contributing mechanism is the loss of inhibition in the descending noradrenergic pathway arising from the locus coeruleus, thus diminishing the endogenous analgesic effect (11). Insufficient descending inhibitory pathways have been linked with complex regional pain syndrome (CRPS) and has been associated with fibromyalgia, rheumatoid arthritis, among other conditions.

Pain may also be classified clinically based on an underlying pathology which can cause nociceptive or radicular pain radiating to the thighs and lower leg, and it may be associated with radiculopathy (14). Radicular pain is a form of nociceptive chronic pain caused by ectopic discharges originating in the dorsal nerve root or ganglion that propagates in a dermatomal distribution (5,15). Radiculopathy, in contrast, is characterized by impairment of motor fibers causing weakness and diminished reflexes along the spinal nerve roots not in a dermatomal manner. Radicular pain and radiculopathy can occur together, or may be mutually exclusive (16).

The back is not a specifically defined anatomical region, however low back pain (LBP) is generally defined as spinal and paraspinal pain symptoms affecting an area of the lumbar spine between the 12^{th} rib and the gluteal folds (2). LBP symptoms may derive from anatomic sources such as nerve roots, muscle, fascial structures, bones, joints, intervertebral discs, and abdominal organs (5).

Based on data collected in 2010, it was reported that LBP causes more global disability than any other condition, ranking highest in terms of disability, or years lived with disability (YLDs) and sixth in terms of overall disease burden, or disability-adjusted life years (DALYs) (17). LBP constitutes one of the top five reason for physician office visits, and it is the leading cause of years lived with disability and ranks sixth in terms of overall disease burden (disability-adjusted life-years) (17,18). It is more common in females than males, and in individuals aged 40-69 (19).

It has been shown that the attitudes and beliefs of healthcare workers directly influences their clinical advice and treatment and significantly influence patient beliefs (20,21). Despite efforts made by most countries to develop standardised treatment guidelines, clinician adherence remains relatively low and attachment to antiquated approaches and misconceptions drives costs upwards, result in unnecessary tests, and has the potential to cause patient harm.

Historically, the clinical assessment of back pain has followed a biomechanical model with a focus on finding a pathoanatomical explanation for pain in the form of discogenic pathology or degenerative changes. The pain experience is now recognized as being multidimensional and can include subjective sensory, cognitive, and emotional aspects. The subjective experience of pain includes both physical and psychological changes, which are modified by primary pain signals, as well as secondary problems that can complicate its diagnosis and management (9).

Experts now have a better understanding of the development and progression of chronic back pain towards disability and the biopsychosocial aspects of the experience of back pain (22). The biomechanical model views the existence of pain and disability as a consequence of physical pathology, whereas the biopsychosocial model views pain in a broader context including tissue damage influenced by social and psychological factors (23,24). Recent research has focused on several of the biopsychosocial aspects as risk factors to back pain.

A number of risk factors that have been shown to predispose individuals to LBP disability include language, educational level, compensation benefits, divorce, and other health comorbidities (25). Prevalence of conditions associated with chronic pain that tended to be linked with poor outcomes include higher rates of depression, psychological distress, passive coping strategies, fear avoidance beliefs, anxiety, as well as sleep disturbances (26–28). Behavioural factors such as fear avoidance, fear of reinjury and movement (kenesiophobia), catastrophizing, or an excessively negative orientation towards pain may be protective in acute injury, but have also been established as a mechanism for increasing patient disability and developing of chronic pain (29,30). Though these factors may be used prognostically, they do not show a link to causality, and thus how useful they are and their potential impact in a clinical setting remains uncertain (27).

1.2. Clinical Importance of Low Back Pain

1.2.1. Problem Statement

There is an enormous healthcare cost associated with the misdiagnosis and overdiagnosis of back pain, and the total direct medical cost of chronic LBP due to ineffective resource utilization has been found to be significantly higher than in those suffering from acute back pain than in controls (26). Approximately 5% of the patients with back pain disability account for 75% of the costs associated with its diagnosis and treatment, where the highest source of costs are associated with lost work productivity, physician visits, diagnostic testing, and treatment (26,31).

Although there is only a weak association between back pain symptoms with imaging results and anatomic or physiological changes, many clinicians continue to utilize diagnostic testing to pursue an underlying pathology (32). In the majority of cases pain is self-limiting and spontaneous recovery is the norm, therefore determining the exact cause is unlikely to be either successful or very useful. Despite evidence that early and routine imaging and other tests do not generally lead to a definitive diagnosis or improved patient outcomes, the application of this approach does not take into consideration the influence of patient pressure and other factors associated with an effective doctor-patient relationship (33).

1.2.2. Low Back Pain Incidence, Prevalence, and Prognosis

Low back pain (LBP) is among the "big 4" rheumatology-musculoskeletal symptoms along with osteoarthritis, soft tissue rheumatism, and inflammatory rheumatic diseases (34). The prevalence of back pain is significant, and the estimated lifetime prevalence of acute and chronic back pain is 60-80% within the general population (32,35–37). The most common reasons for patient visits to primary care for LBP, comprising more than 95% of cases seen, include non-specific LBP, radicular pain, or neurogenic claudication with non-specific back pain representing 90% of cases (19).

LBP is the leading cause of physician office visits, hospitalization and surgery, and lost work disability (28,32). The fact that a relatively benign and self-limiting physical condition can have such large socioeconomic, societal, and medico-legal consequences highlights the need for evidence-based approaches in its diagnosis and management.

The prognosis of back pain and associated disability, even in an acute presentation, remains optimistic with the majority of patients experiencing positive results within three months (38). The

majority of cases of back pain are self-limited and characterized by rapid improvement in pain and disability within one month, and most individuals often do not seek medical treatment (38–40). In a minority of cases, up to 15% of patients develop chronic pain and disability persisting beyond 12 weeks (26,38).

1.3. Common Causes of Back Pain

A number of risk factors for back pain have been reported in the literature, though there is little consensus, reflecting a vague etiology much of the time. In some of the more rare instances of back pain, congenital abnormalities of the spine can be the cause (32). Patients with chronic LBP tend to have a higher number of comorbid conditions, most commonly neck or back pain other than LBP, musculoskeletal, and neuropathic radicular pain radiating to the buttock and leg due to disc herniation (26).

The vast majority of back pain incidence has historically been non-specific backache caused by injury to the muscles, ligaments, bones and discs; and although heavy lifting is a risk factor, most patients cannot attribute a specific inciting incident (32,35). The anatomical structures implicated in producing back pain include the supraspinous, intraspinous and longitudinal ligaments, the ligamenta flava, facet joint capsules, and the peripheral fibers of the annulus fibrosus, all collectively innervated by afferent nociceptive fibers of the posterior primary rami (3,41). The efferent branches of these nerves also innervate the paraspinal muscles, often causing muscle spasms associated with the clinical picture of LBP.

Approximately 98% of patients experiencing back pain do so as the result of some unexplainable event, stress, or injury to the muscles, ligaments, bones or disks (32). The most common etiologies associated with back pain include muscle and ligament trauma, herniated disk, degenerative changes, spinal stenosis, instability, and nonspecific sequelae from previous surgery, where some of the more rarer causes include congenital malformations and malignancy (32). Genetic antecedents which have been connected with LBP include isthmic spondylolisthesis, spinal osteochondrosis (Scheurmann's disease), and spinal stenosis associated with achondroplasia (3).

1.4. Clinical presentation

Clinically, back pain is often divided into five broad categories for the purpose of triaging those requiring specialist referral. The primary categories include: systemic problems beyond the lumbar spine (i.e. renal colic), a serious disorder affecting the lumbar spine (i.e. epidural abscess), LBP associated with radicular pain (i.e. intervertebral disc herniation), neurogenic claudication (i.e. central spinal stenosis), or non-specific low back pain (19).

Radicular pain, or sciatica, is defined as intense pain in the distribution of a lumbar nerve root, radiating from the buttock to the thigh and calf and suggests nerve root irritation or compression (42). Radicular pain refers to pain evoked by ectopic discharges projecting from a dorsal root or its ganglion, most commonly caused by nerve inflammation due to a compressive intervertebral disc herniation (5,14). True sciatica affects approximately 1% of patients with acute LBP and is usually caused by a prolapsed intervertebral disc and can be accompanied by neuropathy, or neurosensory numbness and paresthesia, and motor deficits (3).

1.5. Back Pain Diagnosis

The subjective nature of back pain can make it difficult to quantify, and its diagnosis can be a difficult endeavour. There is a significant amount of variability amongst clinicians who attempt to do the most to manage their patients' pain, which results in wildly different diagnostic approaches and medical treatments. In 10% of cases, however, there can be serious and systemic conditions which can cause low back pain, and in an even smaller minority, may be an indication of underlying malignancy (32,34).

Diagnosis of pathological conditions associated with LBP generally begins with a physical exam. Identification of disc herniation with radiculopathy is usually initiated using manual muscle testing, supine straight leg raise, Lasègue sign, and crossed Lasègue sign (5). The use of diagnostic imaging is generally indicated only if there are signs of radiculopathy or other red flag symptoms such as saddle anesthesia, bowel/bladder involvement, asymmetric loss of deep tendon reflexes, pulse inequality, hypotension or circulatory instability. These signs may be indicative of cauda equina syndrome, epidural abscess, rupture of aortic aneurysm, or aortic dissection (34,37).

Only 10-20% of patients receive a precise pathoanatomical diagnosis as the source of their back pain, and therefore more than 85% of patients presenting with back pain in primary care, do

not receive a specific diagnosis despite a clinical overreliance on diagnostic imaging (13,33,34). Studies have shown that patients with mechanical back pain usually have normal spinal radiographs, and nearly 70% of patients with evidence of lumbar disc degeneration are asymptomatic (34). After the age of 50, Handa, 2019, noted that nearly 70% of individuals will have evidence of spinal degenerative changes. In one study, it was found that herniated discs as evidenced by MRI were found in 20% of pain-free subjects under the age of 60, of which 50% had a bulging disc (43).

1.6. Back Pain Treatment

Both clinician and patient attitudes and approach to pain management appears to have an influence on patient outcomes. Reduced medical costs and number of back pain-related disability claims were observed when positive messaging around activity levels and exercise initiatives were found to improve beliefs around back pain (44). Two common treatment orientation models to pain management include the biomechanical and biopsychosocial approaches. The biomechanical model views the existence of pain and disability as a consequence of physical pathology, whereas the biopsychosocial model views pain in a broader context including tissue damage influenced by social and psychological factors (24,45). Previous studies have shown that clinicians (physiotherapists) with a biomedical treatment orientation view daily activities as more harmful for back pain, and were more inclined to advise patients to limit daily activities and work when compared to those with a biopsychosocial treatment orientation (45).

1.6.1. Non-Pharmacologic Treatment

In recent years, biomedical and structural approaches to pain have been replaced by treatment guidelines based on a biopsychosocial model for the treatment of pain. Such guidelines recommend limited total rest with a graduated return to activities of daily living in the presence of minor pain (46). Research suggests that an individualized approach that takes into account modifiable (i.e. beliefs, mood, behaviours, sleep, activity levels) and nonmodifiable (i.e. socioeconomic status, social circumstances) factors can assist clinicians in determining additional drivers that play a role in the progression of pain and disability (28). The biopsychosocial model recognizes the role of pain catastrophizing as a precursor to pain-related fear and fear avoidance

behaviours, and thus treatment interventions are aimed at reducing fear and the threat of danger, avoidance, and disability (45).

Current best practice guidelines in the management of back pain support non pharmacologic treatment as a first line therapy. It is recommended that general advice on the most common types of acute or sub-acute LBP should include recommendations to remain active (47,48). Recommendations include early ambulation and providing patients with advice to stay active, and reassurance as to the high chance of a good prognosis including an evidence-based explanation regarding expectations and its therapeutic mechanism (46,49,50). Clinicians following evidence-based medicine direct their efforts towards educating patients and encouraging a return to daily activities, early ambulation, and exercise over bedrest.

The recommendation of exercise and early ambulation over bed rest for the treatment of acute and chronic back pain is a reversal from earlier protocols, which relied on protection, immobilization, and bedrest (34,51). This reversal has created confusion among both clinicians and patients, where patients with acute back pain are more often counselled to both exercise while protect the perceived tissue injury to reduce harm (24).

1.6.2. Pharmacologic Treatment

Pharmacologic treatment for acute LBP endorsed by the latest recommendations are second line recommendations after nonpharmacologic measures, and include nonsteroidal anti-inflammatory drugs (NSAIDs) and muscle relaxants (49). In reality, the most commonly prescribed drugs for treating LBP in family physician offices included NSAIDs, acetaminophen, muscle relaxants/sedatives, narcotic analgesics, corticosteroids, antidepressant drugs, barbiturates and barbiturate-like drugs, local anesthetics, estrogens and calcium, and drugs apparently unrelated to low back pain (35).

Skeletal muscle relaxants are generally divided into two categories: antispasmodic and antispasticity medications. Antispasmodics are used to decrease muscle spasm and includes benzodiazapines and non-benzodiazapines (52). Antispasticity medications, such as dantrolene, act on the peripheral nervous system in the blockade of calcium channels within the sarcoplasmic reticulum, reducing calcium and the actin-myosin interaction. Skeletal muscle relaxants, including baclofen or dantrolene have little evidence of efficacy (26,52).

First line pharmacologic treatment should be prescribed at the lowest effective doses for the shortest period necessary, and the trade-off between analgesia, safety profile, and side effects should be weighed (33,49,50).

For patients with severe, disabling pain which cannot be controlled with first line treatment, opioid analgesics or tramadol may be recommended (33). Polypharmacy has been found to be an issue in a significant number of patients with chronic LBP due to the presence of comorbidities such as depression, anxiety, and insomnia and the most frequent combinations are NSAIDS, opioids, and muscle relaxants (26).

1.7. Back Pain Clinical Guidelines

Clinical guidelines for the management of acute LBP have been established in most developed countries (53). The most recent published guidelines include the 2016 UK National institute for Health and Care Excellence (NICE) clinical guideline for low back pain and sciatica as well as the clinical practice guideline published in 2017 by the American College of Physicians (49,50). Clinical guidelines highlight a reliance on nonpharmacologic over pharmacologic treatment for the management of both acute and chronic back pain as the first line treatment of choice. Despite these efforts, studies have shown that physician compliance to the recommended guidelines remains low, with only 21% of primary care physicians reporting that they provided advice and reassurance, a measure recommended by all current major guidelines (53,54).

Non-pharmacologic recommendations for the treatment of acute nonspecific LBP, based on low to moderate evidence from randomized controlled trials (RCTs), include advice to stay active, massage, and spinal manipulation (49,50,53). The guidelines are not in agreement regarding nonpharmacologic treatments of heat (recommended by UK guidelines and not the US) and psychologically informed physiotherapy (recommended by the US guidelines and not the UK).

Non-pharmacologic recommendations according to these guidelines for treatment of chronic persistent LBP include exercise, spinal manipulation, cognitive behavioural therapy, behavioural (operant) therapy, multidisciplinary therapy, and massage. The 2016 UK guidelines, however, do not support the use of acupuncture, whereas the 2017 US guidelines do (49,50). Non-pharmacologic treatment recommendations for the management of radicular pain include exercise recommended by both guidelines and multidisciplinary therapy by the UK guidelines only.

Both current guidelines agree only on the use of NSAIDs for the pharmacologic treatment of acute nonspecific back pain, with the US guidelines also recommending muscle relaxants in some circumstances and the UK guidelines recommending weak opioids with unsuccessful first attempts at NSAIDs (49,50,53). The US guidelines support the recommendation of opioids as second line therapy and as a last resort (49). Additional pharmacological measures are recommended for the management of radicular pain, where both guidelines support the use of opioids as second line, rescue, and short-term therapy. Additionally, the UK guidelines recommend the use of pregabalin, gabapentin, amitriptyline, and duloxetine for radicular pain, however the US guidelines do not recommend these due to insufficient evidence. Lastly, epidural steroid injection and surgery including lumbar discectomy is recommended in the UK guidelines following failed nonsurgical treatment and radiographic findings consistent with clinically present sciatic symptoms (50).

1.8. Back Pain Misconceptions

Approximately 80% of individuals will experience LBP in their lifetime, with 10% progressing to chronic LBP (32,35,36). Misconceptions regarding LBP have been previously established as a risk factor predictive of chronic LBP progression and disability (25). Back pain misconceptions include clinical misunderstandings, as well as fear avoidance, and negative beliefs (55,56). Misguided attempts by clinicians to manage back pain based on commonly held misconceptions can be not only costly and result in patient harm through unhelpful and unwarranted diagnostic tests, but can also encourage poor coping strategies and reinforce fear avoidance behaviours (29,35,57).

The '*Myths of Back pain'* were first introduced by Deyo, 1998, and were based on commonly held misconceptions surrounding back pain (32). The importance of clinician adherence to these beliefs in spite of either their contraindication or lack of supporting evidence is important to understanding the mismanagement of back pain and physician-patient interactions.

Differences in beliefs regarding back pain have been observed between doctors of different specializations with respect to their approach towards LBP as well as their adherence to established guidelines (21,53). Previous studies have examined the differences in attitudes and knowledge amongst healthcare providers following educational interventions (36,58–60), discrepancies in

attitudes between clinical professions (21,61,62), across professional and academic years (22), as well as between male and female participants (22,36,63).

Physician attitudes such as fear avoidance, and those with a biomedical orientation are less likely to adhere to treatment guidelines and as such, are more likely to recommend limiting early ambulation and provide sick leave prescription (20). In one survey, it was found that 25% of patients with acute LBP were referred for imaging upon their first visit with a family physician (64). Some explanations for this include doctors efforts to appease patients, as well as their desire to maintain the doctor-patient relationship (57). Additionally, the amount of education specific to back pain has been shown to promote physician competence and adherence to established diagnostic and treatment guidelines in line with evidence based medicine (65).

Differences in approach to back pain diagnosis has been shown to vary among specialists, where rheumatologists were most likely to order laboratory tests for arthritic conditions, neurosurgeons tended to order imaging tests, and neurologists preferred to refer to results of electromyograms (32).

According to the literature, healthcare professionals' attitudes and beliefs affect patient outcomes and can be predictive of patient disability (20,45). Complicating this, is a general deficit in pain curricula in medical school, where sometimes negative orientations towards biopsychosocial problems may be nurtured (66,67).

Future clinicians will be entering a field in which they are expected to balance the provision of best possible clinical care for their patients experiencing back pain based on the best available evidence, while maintaining an effective doctor-patient alliance. Clinician beliefs and a biophysical approach have been shown shape the advice offered to patients, resulting in deleterious effects such as limiting physical activity, over diagnosing, and promoting the development of psychosocial risk factors leading to chronic pain and disability (24,46). The purpose of this study was to investigate to what extend medical students in English and Croatian, and in comparison, to Dental and Pharmacy students at USSM, believe the most commonly held back pain misconceptions.

2. OBJECTIVES

Physician beliefs and attitudes as well as the level of adherence to clinical guidelines and effective use of an evidence-based approach towards back pain can influence the way this common clinical problem is managed. Myths regarding back pain, such as the belief that back pain is related to bodily injury, myths surrounding unrealistically high expectations regarding diagnostic testing, as well as its treatment have been introduced previously in the literature (32). The ubiquitous findings of pathology such as herniated discs and spinal stenosis in clinically normal and pain-free patients can lead to interventions causing unwarranted harm to patients. Furthermore, unsubstantiated treatment advice such as bedrest for acute back pain can cause loss of income from missed work without the benefit of improving the back pain sufferers clinical course, while in some cases, worsening it (32).

The aim of this cross sectional study was to investigate the prevalence and degree to which students at University of split school of medicine (USSM) believe the seven commonly held myths about back pain introduced by Deyo (32). The myths were developed to assess commonly held beliefs about etiology, diagnosis, and treatment of back pain. This study sought to investigate the prevalence and degree to which students held these beliefs and compared them between students of USSM across medical studies in English, medical studies in Croatian, dental medicine and pharmacy students.

Our research hypothesis for this study was that (1) students at the USSM have a lower level of agreement with the back pain myths in comparison to lay populations found in previous studies (68), (2) students of the higher years of studies have a lower degree of agreement with the myths than do students of the lower years of study, (3) students of Medicine have a lower degree of agreement than do students of Pharmacy and Dental medicine, and (4) that there is no difference in the degree of agreement of the myths between male and female students

3. MATERIALS & METHODS

A cross-sectional study was carried out at the University of split school of medicine, Croatia between May-October 2020. Students enrolled at the USSM in the faculties of medicine in English and Croatian, dental students, and pharmacy programs were invited to participate in the study.

The study instrument was a back pain questionnaire (BPQ), which was administered to students in all academic years (1 - 6 for medical studies and dental medicine, and 1 - 5 for pharmacy) and was made accessible online. Data were collected with consent, and participation was voluntary, anonymous, and without compensation.

For a confidence interval of 95% and type I error rate of 5%, the required sample size to draw comparisons between the different faculties was calculated at 285. A total of 311 students, out of 1,100 enrolled at the USSM participated in the study.

The background and the aim of the research were explained in the first part of the questionnaire. Students were given the option to provide their general demographic data, such as age, gender, year of study, and program of study. The BPQ included Deyo's "Myths of Back Pain" regarded as the most commonly held misconceptions found in clinical practice as well as selected questions from the modified questionnaire developed in Ottawa, Canada (32,65,69). In addition to the BPQ and demographics, students were also asked about their personal experience with back pain in the past 6 months, whether or not they had sought the advice of a professional for their back pain, whether they had received any targeted education specific to back pain, as well as their assumptions regarding what percentage of patients they estimated visited a family practitioner for back pain symptoms.

Responses to the BPQ were collected using a 5-point Likert scale, and were grouped into three categories: strongly disagree or disagree, neither disagree/agree, strongly agree or agree. Answers regarding the respondent's previous experience with back pain were collected on a 3-point scale; yes, no, or unsure. Finally, answers regarding the respondent's assumption of patients presenting to a family practitioner with back pain was collected as follows; $< 25\%$, $> 25\%$, or unsure.

The results were collected, and data were analysed using Microsoft Excel and JASP 0.9.2.0. A descriptive analysis was conducted with results expressed in frequencies and percentages for dichotomous variables, and as means with standard deviations (SD) for continuous variables, which were tested for normality using the Kolmogorov-Smirnov test and were normally

distributed. The percentages were calculated for every outcome. A nonparametric χ^2 test was used to assess differences and correlations between groups and variables. Our study determined statistical significance to be $P < 0.05$.

This study was approved by the USSM Ethical committee, approval number: 2181-198-03-04-20-0053. This research has been conducted in accordance with the World Medical Association Declaration of Helsinki.

The questionnaire has been added to the supplementary material included with this thesis.

4. RESULTS

In this study, 312 (28%) out of 1,100 students from four programs participated during the 2019/2020 academic year. Responses were analysed across the four academic programs within the medical school which included: 66 students of medical studies in English, 171 students of medical studies in Croatian, 40 Dental students, and 34 Pharmacy students (Table 1). One response was eliminated for incompleteness, leaving 311 responses for comparison by program. The distribution of student respondents also included students by year of study from 1-6. Out of 311 students, 26.6% of participants were male and 73.4% were female.

Table 1. The number of students that participated in the research by program of study and by year of study. Program of study refers to those enrolled in either medical studies in English and Croatian, Dental medicine, and Pharmacy programs at the University of Split School of Medicine during the 2019/2020 academic year.

	Program of Study				
Year of Study	**Dental Medicine**	**Medicine - English**	**Medicine - Croatian**	**Pharmacy**	**Total**
1st year	13	16	73	17	119
2nd year	3	16	6	1	26
3rd year	11	4	20	14	49
4th year	1	6	29	0	36
5th year	10	15	19	2	46
6th year	2	9	24	0	35
Total	**40**	**66**	**171**	**34**	**311**

The median age of the participants was 21.0 (18-32) years and student participants were between the age of 18 and 32 years. The average age of participant medical students in English was 24, for Croatian medical students was 21, for Dental Medicine was 22, and for Pharmacy was 20 years.

Table 2. Self-reported back pain, utilization of health care professionals and back pain education of students of four study programmes at the University of Split School of Medicine during the 2019/2020 academic year.

	Dental medicine	**Medicine in English**	**Medicine in Croatian**	**Pharmacy**	**Total**
Students' episodes of chronic persistent low back pain for more than 6 months N, (%)					
Never	30 (75.0)	51 (77.3)	127 (74.7)	21 (61.8)	**229 (73.9)**
Experienced In the past	6 (15.0)	6 (9.1)	27 (15.9)	10 (29.4)	**49 (15.8)**
Experiencing currently	4 (10.0)	9 (13.6)	16 (9.4)	3 (8.8)	**32 (10.3)**
The number of students seeking help from a healthcare professional for low back pain N, (%)					
	6 (15.0)	14 (21.2)	30 (17.5)	6 (17.6)	**56 (18.0)**
The number of students that received any education specific to low back pain N, (%)					
	9 (22.5)	25 (37.9)	64 (37.4)	4 (11.8)	**102 (32.8)**

N=number of students

On average, the majority of students across all programs (74%) self-reported that they had never experienced episodes of chronic back pain either currently or in the past (Table 2). When these data were compared across programs of study, Pharmacy students reported slightly more experience with back pain (38.2%) than the average (26.1%), however differences between students of different study programs were not significant.

With an average of 26.1% of students having experience with back pain, 18% of student respondents reported that they had sought treatment from a healthcare professional, with the majority being medical students in English, and the lowest being students of dental medicine.

Approximately 37% of both medical students in English and Croatian reported having received previous education related to back pain and a lower number did so from dental medicine and pharmacy programs (22.5% and 11.8% respectively). Of the respondents, 20% of respondents indicated that they were unsure if they received such education, with the remaining (almost 48%) stating that they had not received any education specific to back pain (data not shown).

The majority of students reported having received back pain education (72.2%) by the 3rd year of their studies as compared to years one and two (16.7%, 34.6% respectively) (data not shown).

Self-reported incidence of chronic back pain was not significantly different between males and females, with males reporting a slightly higher (80%) frequency of back pain as compared to females (72%) (data not shown). The proportion of males who reported that they had received education specific to backpain was 6% higher than what was reported by females. Additionally, approximately 1% more males than females reported seeking help from a healthcare professional for back pain.

When asked "*What percentage of patients would you estimate visit a primary care physician with complaints of back pain?"* on average across the four study programs, approximately 20% of students believed that this patient percentage was less than 25%, approximately 70% believed that it was more than a quarter of patients, and 10% were unsure.

When responses to this statement were compared across year of study, almost 89% of 4th year students, and 83% of 3rd year students, and 74% of 6th year students estimated that over 25% of patients visit a primary care physician with complaints of back pain, whereas only 59%, 65% and 69% of 1st, 2nd and 3rd year students, respectively, felt that this percentage was greater than 25% with a higher number reported being unsure (data not shown). These results were found to be significant (χ^2=21.64, P<0.05).

When investigating the degree to which students agreed or disagreed with commonly held misconceptions related to back pain, we included brief statements that were scored by respondents in our LBQ. Of the original seven myths established by Deyo, 1998, significant between group differences were found amongst student responses across the four study programs (Figures 1-3).

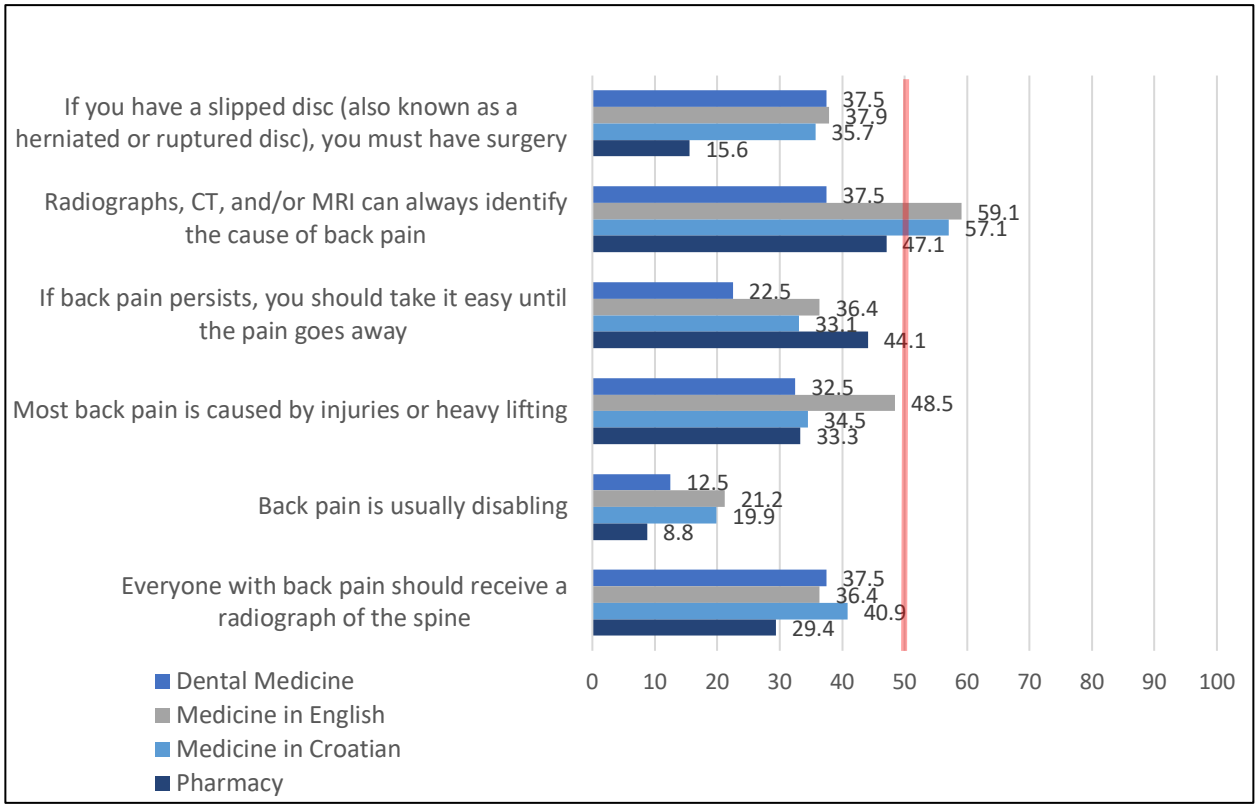

Figure 1. Students' responses to the Back Pain Questionnaire compared across the four study programs – Dental medicine, medicine in English, medicine in Croatian, and Pharmacy at the University of Split School of Medicine. The figure shows the proportion of correct responses (%).

Approximately 44% of medical students in English, 41% of pharmacy, and 30% of medical students in Croatian, and dental medicine students agreed with the statement '*Everyone with back pain should receive a radiograph of the spine'*. Across all study programs, approximately 35% of students accepted that all patients with LBP should receive a radiograph of the spine, however 20.6% believed that radiograph, CT, or MRI imaging is effective in determining the cause of back pain. Of the medical students in English, 44% accepted the regular use of radiographs of the spine for back pain symptoms, and less than 20% accepted that imaging can always identify the etiology of back pain.

Overall, the statement that students agreed with the most was that '*Back pain is usually disabling*', where 53.1% of students accepted this myth. Sixty percent of dental students, 53% of both pharmacy and medicine in Croatian students and 49% of English medical students agreed with this statement.

Overall, over 50% of pharmacy students agreed with the statements that surgery is a requirement for a slipped disc. Also, 53% of dental medicine students and 44% of medical students in Croatian agreed that taking it easy is the recommended approach for persistent back pain.

Most 4th and 5th year students (47% and 54%) disagreed with the statement '*If you have a slipped disc, you must have surgery*', however only 37% of the 6th year students and less then 30% of the 1st, 2nd and 3rd year students disagreed with this myth (χ^2 = 20.21, *P*<0,05).

Half of the 2nd year students disagreed with the statement '*Most back pain is caused by injuries or heavy lifting*', while only 22%, 33% and 37% of the 4th, 5th and 6th year students disagreed with this statement (χ^2 = 20.39, *P*<0,05) (data not shown).

Overall, 34% of students accepted the statement that '*Everyone with back pain should receive a radiograph of the spine*', with 5th year students representing the majority (45.7%) and 6th year students a minority (22.9%) ($\chi^{2=}$22.07, *P*<0.05)

In general, a slightly higher proportion of medical students in Croatian and pharmacy (44% and 42% respectively) rejected the back pain myths than did the medical students in English (40%) and dental medicine (37%) (Figure 2). There were significant differences between study programs in response to the statement '*bedrest is the mainstay of therapy for back pain',* where 50% of English medical students and 35% of Croatian medical students disagreed with the statement (χ^2=13.49, *P*<0.05) (Figure 2).

When it came to agreeing with the statement that '*A bad back should be exercised'*, 10% of dental students, 3% of pharmacy students, and approximately 16% of medical students in Croatian disagreed (Figure 2), whereas over 30% of medical students in English incorrectly rejected this statement (χ^2= 16.49, *P*<0.01).

Female respondents were significantly more likely (49.8% female vs 38.6% male) to reject the belief that '*bedrest is recommended for acute low back pain'* (X^2 =7.1, *P*<0.05) (data not shown).

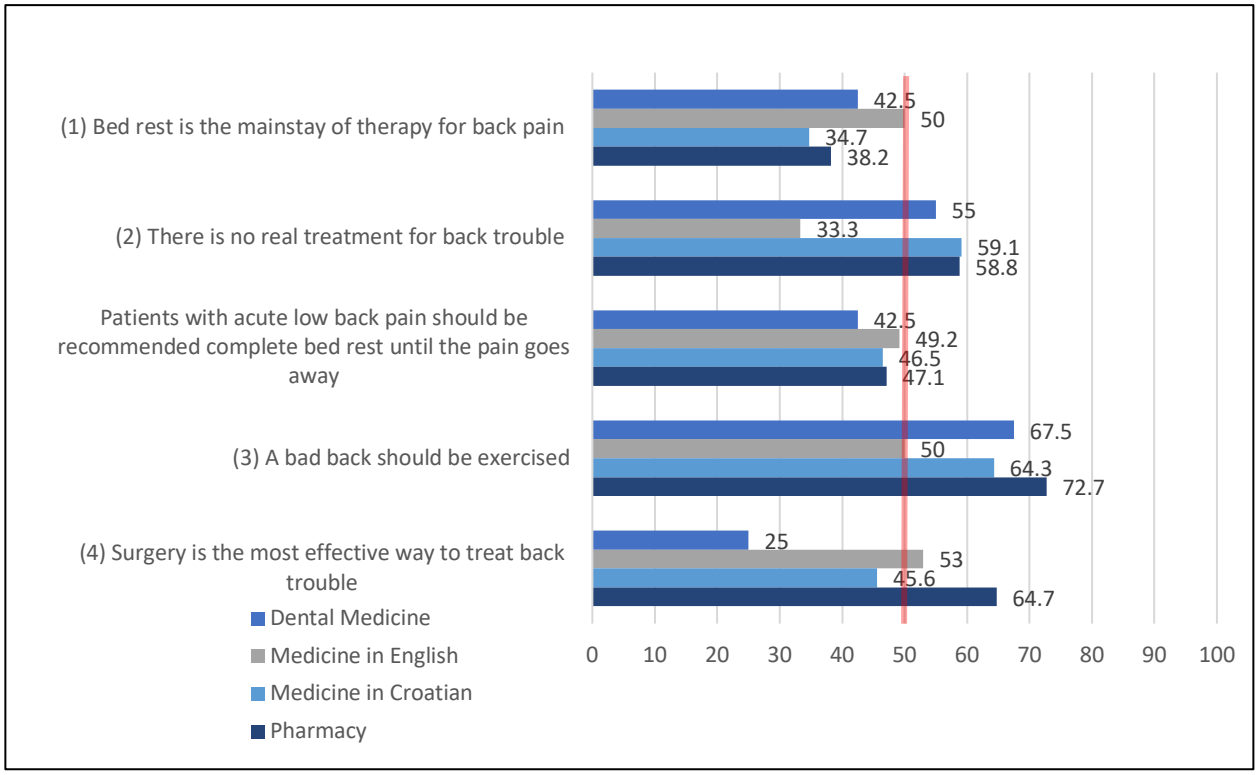

Figure 2. Students' responses to the Low Back pain Questionnaire compared across the four study programs - Dental medicine, medicine in English, medicine in Croatian, and Pharmacy at the University of Split School of Medicine. Shows the proportion of correct responses (%).
(1) P=0.04), (2) P<0.001, (3) P=0.01, (4) P=0.01

Overall, a greater proportion of students across all programs of study agreed with the statement supportive of alternative treatments for back pain (25.5%) than they did with the statement endorsing medication as a treatment for back pain (13.8%) which was the statement associated with the least level of agreement overall (Figure 3). Students reported the lowest level of agreement with surgery as an effective treatment (18.6%) as well as healthcare professional intervention having little effect on back pain (18.0%).

No students of the pharmacy program agreed with the statement that '*Medication is the only way to relieve back trouble*', which differed significantly from responses from medical students in English by 27.3% and the average of the other medical programs by 13.8% (χ^2=19.7, P<0.005). There were also significant differences in beliefs around alternative regimens as the treatment for back pain where 15.4% of dental students, 30.3% of medical students in English, 24% of medical students in Croatian, and 35.3% of pharmacy students agreed with such an

approach (χ^2=14.09,P<0.05). On average, only 18% of students across all study programs accepted the statement that '*intervention by healthcare professionals has little impact on back pain'.* Medical students in English were most likely to agree that '*There is nothing physically wrong with many patients with back pain*' (53.0%), compared to a minority of pharmacy students that shared this belief (20.6%, χ^{2_2}=19.62, P<0.05).

Fourth year students were least likely to agree with the statement that '*every patient reporting with back pain should receive radiograph imaging of the spine'*; where approximately 67% disagreed with the statement, in contrast to the 33% of 5th year and 43% of 6th year students. The greatest number of students reporting that they were unsure was those in their 3rd year (37%), and the lowest was those from the 5th (20%) and 6th (23%) years (χ^2= 22.07, P<0.05) (data not shown). Fourth and 6th year students were less likely to believe that *'X rays of the lumbar spine are useful in the workup of patients with acute low back pai*n' (average 25.4%), as compared to the remaining years (average 36.9%).

The most frequent response to the statement '*Alternative treatments are the answer to back troubl*e' was "unsure" (43.7%) as compared to those that firmly agreed or disagreed (25.7%, 30.5% respectively). Differences between study years for those who were unsure about their views on alternative treatments ranged from 30% of 2nd year students to 50% and 51% of 5th and 3rd year students respectively (data not shown). These differences were significant (χ^2 = 18.3, P<0.05).

The frequency of agreement to the statement *X rays of the lumbar spine are useful in the workup of patients with acute low back pain*, was significantly lower in students of the 6th year of study (23%) as compared to the 5th year students (46%).

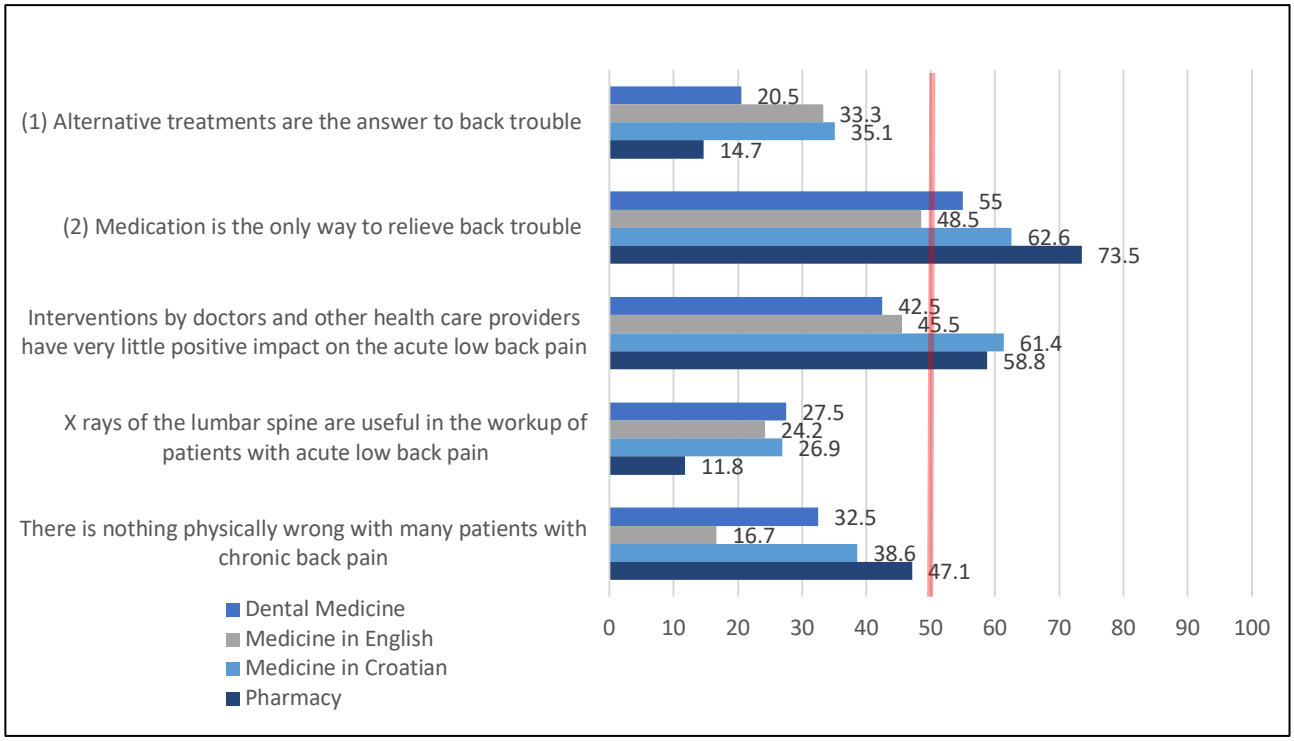

Figure 3. Students' responses to the Back Pain Questionnaire compared across the four study programs - Dental medicine, medicine in English, medicine in Croatian, and Pharmacy at the University of Split School of Medicine. Shows the proportion of correct responses (%).
(1) P=0.03, (2) P=0.003

More than 30% of student respondents agreed with the statement '*X rays of the lumbar spine are useful in the workup of patients with acute low back pain*'. Only 14.2% of 1st year students correctly rejected this statement whereas 40% of 6th year, and 47.2% of 4th year students disagreed with it (Figure 3). These differences were found to be significant (χ^2 = 32.24, P<0.005) (data not shown). Sixth year respondents were more likely to agree with the statement that '*There is nothing physically wrong with many patients with back pain'* as compared to 1st year students (48.6% vs. 25% respectively).

Female respondents were significantly less likely to accept the belief that '*medication is the only way to treat back pain'* (10.9% vs 21.7%, χ^{22}=6.66, P<0.05). Male respondents, however, were more likely to reject the belief that '*alternative medicine is the answer to back pain*' (42.2% male vs 26.3% female, $\chi^2$12.5, P<0.05), and that '*surgery is required as treatment for a slipped disc'* (43.4% vs 31.3%, χ^{22} = 7.5, P<0.05). Overall, the majority of male and female respondents (59.9%) tended to be in agreement in rejecting the belief that '*medication is the only way to relieve back trouble*' (data not shown).

5. DISCUSSION

In this study we investigated the prevalence and degree to which students across four study programs: medicine in English, medicine in Croatian, dental medicine, and pharmacy at the University of split school of medicine (USSM) believe the back pain myths.

Our results suggest that students at USSM do believe some of the back pain myths. Amongst the study participants at USSM, differences were found between the attitudes and beliefs towards back pain based on program of study, year of study, and by gender. Previous studies have found medical students to be more adept at dispelling the myths than the general public, that medical education improves student understanding of back pain, and promotes positive attitudes towards patients with back pain and their functional abilities (36,70). It was expected that students at USSM, regardless of their program of study, would generally hold more clinically helpful backpain beliefs than the general public based on what has been reported in the literature to date.

A small minority of student respondents (26%) self-reported a personal experience with acute or chronic LBP, and 18% reported having sought the help of a healthcare professional for their symptoms. This prevalence was lower than what has been previously reported (54%, and 37%) in a similar demographic (25,62). Previous cross sectional studies have found that respondents with current back pain generally had more negative views than other groups (24). Across the study programs, an average of 33% of student respondents indicated that they had received specific education for back pain, with only 12% from the Pharmacy program self-reporting such education. In a 2009 study, Ali and Thompson, found a similar proportion of 38% of medical students in their study reported having received education on chronic pain in neuroscience lectures (61). Overall, 70% of students answered correctly that over 25% of physician office visits were due to patient complaints of chronic back pain when in fact, chronic back pain has been reported to be one of the most common reasons for symptomatic physician office visits (71,72). When it came to year of study, significant differences between student perceptions were found. Fourth, 5th, and 6th year students, 89%, 83%, and 74% respectively, agreed that more than 25% of patient visits to a primary care physician were due to backpain, whereas only 59%, 65%, and 69% of 1st, 2nd, and 3rd year students agreed with this frequency.

Overall, we found that a modestly higher proportion of Pharmacy and medical students in Croatian (42% and 44% respectively) correctly rejected the back pain myths than did the Dental medicine (37%) and medical students in English (40%).

When it came to the statement '*those with back pain should take it easy until the pain goes away'*, the results obtained are difficult to compare with the literature, suggesting cultural factors may have implications on attitudes towards the usefulness of rest as a treatment for LBP. On average, (43%) of the student respondents agreed with this statement, with Dental medicine students reporting the highest level of agreement (52.5%). This finding represents a lower proportion than what has been reported in the literature from previous studies amongst medical students in New Zealand (69%) and Belgium (77%), and was higher than what was reported from community samples in Norway (26%) and Canada (22%), as well as an Australian physician sample (17.8%) (24,25,44,65).

The majority of students across all study programs (53%) incorrectly accepted the statement that '*Backpain is usually disabling'*, which is consistent with other studies which noted the majority of both medical students and the public tended to agree with this or similarly worded statements (36,44). In a 2014 study which included New Zealand medical students, Darlow et al., noted that 44% of respondents agreed with a statement regarding the disabling and persistent nature of back pain (24). In their 2004 study on a Belgian community sample, Goubert et. al, reported that only a small fraction of 8.2% of their respondents reported their back pain to be highly disabling according to the Graded Chronic Pain Scale (25).

In this study, we found that 44% of medical students in English, 41% of pharmacy, and 30% of medical students in Croatian and dental medicine students agreed with the statement '*Everyone with back pain should receive a radiograph of the spine'.* This result corresponds closely with similar studies when it comes to back pain diagnosis, where 42% of respondents were reported to agree with this statement (25). In another study involving medical students, 38% were found to accept this statement compared to 59% of the general public (36).

When it came to the statement that *'bedrest is the mainstay of therapy for back pain',* 36% of English medical students and only 24% of Pharmacy students disagreed with the statement. In their 2019 study, McCabe et al., noted that almost 60% of the general public believed this myth along with 40% of medical students (36). The clinical significance of this statement has been highlighted in the literature where bedrest as a treatment recommendation has been shown to prolong acute episodes of back pain (48).

The myth with the greatest difference in correct responses when comparing across study programs was that '*there is no real treatment for back trouble'* where 47% of medical students in

English agreed with this statement, compared to only 18% of medical students in Croatian, Dental medicine, and Pharmacy students.

The majority of our survey respondents (63%) correctly agreed that '*a bad back should be exercised*', however there was a significant difference between the proportion that agreed from medicine in English (50%) as compared to 73% in the Pharmacy program. In two similar studies, it was found that a much higher proportion of New Zealand healthcare professional respondents (80%) agreed with an ambulatory approach as compared to a Canadian community population (57%) highlighting the differences observed between healthcare and lay populations as well as potential cultural influences on beliefs (24,44).

When it came to LBP treatment, we found that a greater proportion of students who endorsed alternative treatment regimen for back pain (25.5%) than they did a surgical approach (18.6%) or pharmacological approach (13.8%). It should be noted, however, that overall, the most frequent response to this statement was "unsure" (43.7%) compared to those who firmly agreed or disagreed (30.5%). Differences between study programs were found with regards to the treatment of back pain as well. Of those students in the Pharmacy program, all respondents correctly rejected the statement '*medication is the only way to relieve back trouble'* as compared to 27% of medical students in English who incorrectly agreed with it. In their 2015 study on Australian pharmacists, Abdel Shaheed et al., found that 86% of respondents answered this statement correctly, a finding which had been similarly replicated from a 2003 study on a Belgian community sample (25,73).

Medical students in English were more likely to believe that '*There is nothing physically wrong with many patients with back pain*' when compared to Pharmacy students (53%, 21% respectively). Interestingly, the proportion of Pharmacy students that agreed to this statement was similar to that found amongst Australian physicians without a special interest in back pain (23%) where those with a special interest in backpain were more likely to accept the pain management beliefs contrary to the best available evidence (65).

Compared to other years of study, 4th year students were most likely to reject the statement that '*every patient reporting with back pain should receive radiograph imaging of the spine'* where only 16.7% agreed with this statement as compared to the average (34.6%). Students at across all four programs of study at USSM complete a course in radiology and diagnostic imaging during their 4th year of studies, possibly accounting for a higher proportion of correct responses in this group.

In this study, we found that overall scores between males and females were fairly equivalent with females answering correctly 63.8% of the time and males 59.8%. There were, however, significant differences between the beliefs held by male and female students regarding the treatment recommendations for back pain. Female respondents were significantly more likely (50% female vs 39% male) to correctly reject the belief that '*patients should be recommended bedrest for acute low back pain'*. Female respondents were also significantly less likely to accept the belief that '*medication is the only way to treat back pain'* (11% vs 22% respectively). Male respondents, however, were more likely to correctly reject the belief that '*alternative medicine is the answer to back pain*' (42% male vs 26% female), and that '*surgery is required as treatment for a slipped disc'* (43% vs 31%).

When comparing overall variation between male and female attitudes and beliefs towards back pain, the current evidence is conflicting. Some studies reported no overall differences in performance on the same or similar back pain questionnaires to the instrument we utilized (73,74). This is in conflict with other results such as those reported by Kennedy, et al., 2014, which noted that females were found to have more negative beliefs and attitudes regarding LBP. Ryan et al., in a 2009 study, reported that females were less likely to believe the backpain myths than males. In another study regarding physicians in clinical practice, female physicians were found to be more proficient in determining patients at risk of developing chronicity, they were more concerned about pain experienced by patients and their level of activity, and to believe that heavy lifting should be avoided (63).

Our study did have a number of limitations, most notably those due to a smaller sample group. The lower response rates across all study programs allows for the potential of response bias despite best efforts made to allow all potential participants to take part in the study. We found significant differences between study program, year of study, and gender; however, this study was not designed to assess the impact of other individual factors such as the effect of personal experience with backpain, and informal learning. Additionally, it should be noted that the medical students in English language represent a more heterogenous international group of students than the other three study programs with varied cultural and experiential backgrounds, thus further limiting the generalizability of our results. It would have been useful to further examine the effect of personal experience of back pain on the beliefs of students in our sample, however given the limited number of respondents who experienced back pain this resulted in inadequate power to demonstrate

differences in such attitudes. Given the cross-sectional nature of this study, it represents an approximation of understanding at a single point in time. Additionally, due to the online format of the BPQ, it was not possible to answer questions respondents may have had regarding the study instrument. Generalizability of the results of this study is also limited as sample sizes within each of the study programs and across study year were not distributed evenly with some having lower power and representation.

The findings of our study suggest that misconceptions regarding back pain exist regarding assumptions about its etiology, the pain mechanism and factors influencing chronic pain, as well as treatment and management of back pain. This highlights the importance of future research on potential educational interventions and clinical exposure to common musculoskeletal complaints and management of chronic pain. Effective educational tools would improve student understanding of the biopsychosocial dynamics of low back pain and disability. Several studies have noted beneficial results in changing healthcare practitioner beliefs following chronic pain and low back pain education, however others have found a paradoxical or no effect of similar interventions (63,65,73,75). Therefore, the utility of not only the current state of back pain education should be questioned, but the potential for future educational modules and their ability to provide lasting changes in beliefs should be taken into consideration.

6. CONCLUSION

Misconceptions regarding backpain pathophysiology, diagnosis, and treatment amongst healthcare professionals are costly, may cause patient harm, and are inconsistent with an evidence-based approach (46,71). Backpain misconceptions and negative beliefs held by physicians are more likely to result in non-compliance to existing treatment guidelines (76). Overall, we found that students within our study group at USSM did believe some of the back pain myths where only one statement was believed by a majority of students. We found that students were more adept at dispelling the myths than the general public from other studies, and similarly to other medical students when compared to what has been reported in the literature.

We found that there were significant differences between program of study, year of study, and gender. We did not find that a higher year of study was correlated with a greater number of correct responses.

These findings highlight the need for complementing the traditional education of healthcare professionals by introducing the back pain myths as well as the biopsychosocial influences on chronic pain, and promotion of positive beliefs towards LBP. Further research is required to assess the utility of such an education model and its ability to create a lasting impact on future clinical practice.

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8. SUMMARY

Objectives: The aim of this study was to examine the attitudes and beliefs of medical students in English and in Croatian, Dental medicine, and Pharmacy students at the University of s split school of medicine (USSM) in Split, Croatia and the extent to which the back pain myths were accepted.
Materials and Methods: A cross-sectional study was carried out amongst the student population enrolled at USSM. An online questionnaire was administered to 1,100 students in all academic years and was made accessible online between May-October 2020. Data were collected with consent, and participation was voluntary, anonymous, and without compensation.
Results: A total of 311 students, out of 1,100 enrolled at the USSM participated in this study. The median age of the participants was 21.0 (18-32) years and student participants were between the age of 18 and 32 years.

A minority of student respondents (26%) self-reported a personal experience with acute or chronic low back pain (LBP), and only 18% reported having sought the help of a healthcare professional for their symptoms. Overall, a higher proportion of medical students in Croatian and Pharmacy students (44% and 42% respectively) correctly rejected the back pain myths than did the medical students in English (40%) or Dental medicine students (37%). The majority of students across all study programs (54%) believed that backpain is disabling. The myth with the greatest difference in correct responses across study programs was that '*there is no real treatment for back trouble'.* Forty seven percent of medical students in English agreed with this statement, compared to 18% of medical students in Croatian, Dental medicine, and Pharmacy. A greater proportion of students endorsed alternative treatment regimen for back pain (26%) than they did a surgical approach (19%) or pharmacological approach (14%). Although we did observe differences between year of study, we did not find a correlation between years of training with the number of correct responses. Female respondents were more likely to reject bedrest as a treatment then males (50% female vs 39% male). Male respondents were more likely to reject alternative medicine (42% male vs 26% female) and a surgical approach (43% vs 31%) as the only way to treat back pain.
Conclusion: This study confirmed that students at USSM do believe some of the back pain myths, though to a lesser degree than the general population based on data reported in the literature. Additional training regarding chronic pain and the introduction of the back pain myths into medical school curricula should be explored in order to foster the education of clinicians in order for students to endorse an evidence-based approach in their future clinical practice.

9. CROATIAN SUMMARY

Naslov: Vjeruju li studenti medicine, dentalne medicine i farmacije u mitove o križobolji?

Ciljevi: Cilj ovog istraživanja bio je ispitati stavove i uvjerenja studenata medicine na engleskom i hrvatskom jeziku, dentalne medicine i farmacije na Medicinskom fakultetu Sveučilišta u Splitu (MEFST) o križobolji i u kojoj mjeri vjeruju mitovima o križobolji.

Materijali i metode: Provedeno je presječno istraživanje među studentskom populacijom MEFST-a. Online upitnik bio je dostupan između svibnja i listopada 2020. godine za 1100 studenata svih akademskih godina. Podaci su prikupljeni uz pristanak, a sudjelovanje je bilo dobrovoljno, anonimno i bez naknade.

Rezultati: Ukupno 311 studenta sudjelovalo je u ovom istraživanju. Prosječna dob bila je 21 godinu (18-32), a studenti su bili u dobi između 18 i 32 godine. Manjina ispitanika (26%) prijavila je osobno iskustvo s akutnom ili kroničnom križoboljom, a samo 18% izjavilo je da je zatražilo liječničku pomoć. Veći udio studenata medicine u na hrvatskom jeziku i studenata farmacije (44% odnosno 42%) ispravno je odbacilo mitove o križobolji, u odnosu na studente medicine na engleskom (40%) ili dentalne medicine (37%). Većina studenata (54%) vjerovala je da križobolja onesposobljava pacijente. Mit s najvećom razlikom u točnim odgovorima na studijskim programima bio je da 'ne postoji pravi način liječenja križobolje. Četrdeset sedam posto studenata medicine na engleskom jeziku složilo se s ovom tvrdnjom, u usporedbi s 18% studenata medicine na hrvatskom jeziku, dentalne medicine i farmacije. Veći dio studenata prihvaća kao opciju alternativne načine liječenja križobolje (26%) nego kirurški pristup (19%) ili farmakološki pristup (14%). Iako smo uočili razlike između odgovora studenata različitih godina studija, nismo pronašli korelaciju između godina studiranja i broja točnih odgovora. Studentice u većem postotku odbacuju ležanje u krevetu kao tretman liječenja križobolje od studenata (50% u odnosu na 39%). Studenti su u većem postotku nego studentice odbacili alternativnu medicinu (42% i 26%) te kirurški pristup (43% i 31%) kao jedini način liječenja križobolje.

Zaključak: Ovo istraživanje je potvrdilo da studenti MEFST-a vjeruju u neke od mitova o križobolji, iako u manjoj mjeri od opće populacije na temelju podataka iz literature. Potrebna je bolja edukacija o križobolji u nastavnim programima kako bi se potaknulo i usmjerilo studente na pristup križobolji i općenito medicini zasnovan na dokazima u svojoj budućoj kliničkoj praksi.

10. CURRICULUM VITAE

Personal Information:

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Education:

Medical Degree (MD), University of Split School of Medicine (2015 – expected 2021)

Master of Business Administration (MBA), University of Calgary (2009 – 2011)

Bachelor of Science (BSc.), University of Calgary (2000 – 2004)

Work Experience:

Supply Chain Team Lead, Major Projects 2012-2015
Suncor Energy Inc., Calgary, Alberta Canada

Manager, Strategic Contracts & Shared Services 2006-2012
Alberta Health Services, Calgary, Alberta Canada

Clinical Researcher 2004-2006
Visionary Biomedical Inc.
McCaig Research Institute, Calgary, Alberta Canada

Extra-Curricular:

Volunteer Board Director, Green Calgary 2012-2014

Hospice Volunteer 2013-2014

11. SUPPLEMENT

INSTRUCTIONS:

The following questionnaire is part of a scientific research study in which we want to investigate the knowledge, attitudes and beliefs towards low back pain among students of medicine, dental medicine, pharmacy and medical students in English at University of Split School of Medicine.

The questionnaire is completely anonymous. All the information provided in the questionnaire will be used exclusively for scientific purposes, and the identity of the participants will be completely anonymous for both researchers and the public. In this questionnaire, you will not be asked to provide your name and surname at any time. So please answer the questions fairly and openly.

You will need about 3-5 minutes to complete this questionnaire. Thank you for your participation.

General Information:

Please answer the following questions:

1. Age: _____ (Write in)
2. Gender: ***M/F***
3. Study program: ***Dental medicine / Medical studies in Croatian/ Medical studies in English/ Pharmacy***
4. Year of study: ***(1 / 2 / 3 / 4 / 5 / 6)***
5. Are you currently or have you ever personally experienced episodes of chronic persistent low back pain for more than 6 months? ***(never, past, current)***
6. Have you ever sought help from a healthcare professional for low back pain? ***(YES/NO)***
7. Have you received any education specific to low back pain? ***(YES/NO)***
8. What percentage of patients do you estimate visit a primary care physician with complaints of back pain? ***(< 25%, > 25%, unsure)***

Statements About Low Back Pain:
Please indicate to what extend you agree with the following statements
(*1 = strongly agree, 2= agree, 3= neither disagree or agree, 4= disagree, 5= disagree)*

1. *If you have a slipped disc (also known as a herniated or ruptured disc), you must have surgery.*
2. *Radiographs, CT, and/or MRI can always identify the cause of back pain.*

3. *If back pain persists, you should take it easy until the pain goes away.*
4. *Most back pain is caused by injuries or heavy lifting.*
5. *Back pain is usually disabling.*
6. *Everyone with back pain should receive a radiograph of the spine.*
7. *Bed rest is the mainstay of therapy for back pain.*
8. *There is no real treatment for back trouble.*
9. *Patients with acute low back pain should be recommended complete bed rest until the pain goes away.*
10. *A bad back should be exercised.*
11. *Surgery is the most effective way to treat back trouble.*
12. *Alternative treatments are the answer to back trouble.*
13. *Medication is the only way to relieve back trouble.*
14. *Interventions by doctors and other health care providers have very little positive impact on the acute low back pain.*
15. *X rays of the lumbar spine are useful in the workup of patients with acute low back pain.*
16. *There is nothing physically wrong with many patients with chronic back pain.*