Sains Malaysiana 43(3)(2014): 423–428

Low Back Pain and Associated Risk Factors among Health Science Undergraduates

(Sakit Belakang dan Faktor Risikonya dalam Kalangan Prasiswazah Sains Kesihatan)

NOR AZLIN MOHD NORDIN, DEVINDER KAUR AJIT SINGH* & LIM KANGLUN

ABSTRACT

Identification of associated risk factors is important to enable successful implementation of low back pain prevention strategies. To date, there is limited research data on back pain among young adults in Malaysia despite an increasing incidence of this disabling condition worldwide. A cross-sectional survey was conducted to determine the incidence of low back pain (LBP) and associated factors among health science undergraduates. A self-administered questionnaire was distributed to full time students of a main public university. One hundred and forty undergraduates; mean age 21.4±1.3 years, 70% female, 60% in year 3 of study, participated in the survey. The results showed that 31% spent between 6 and 8 h and another 31% spent more than 9 h sitting in a day. Twelve percent of the undergraduates rated their fitness level as 'poor'. The incidence of LBP was 40.3% among the undergraduates. LBP incidence was associated with age (X^2=12.1, p=0.007), years of study (X^2=8.7, p=0.03), self-rated physical fitness (X^2=7.0, p=0.02) and hours spent sitting (X^2=8.7, p=0.03). Gender, body mass index and hours spent in sports and physical activity were not associated with LBP. The findings from this study demonstrate that physical fitness and sitting duration is associated with low back pain among health science undergraduates. Health science undergraduates should improve their physical fitness, practice frequent breaks and stretching during sitting. This will help to minimize LBP related to decreased fitness levels and prolonged sitting.

Keywords: Back pain; physical fitness; sitting; undergraduates

ABSTRAK

Mengenal pasti faktor risiko adalah penting dalam implementasi strategi pencegahan sakit belakang. Data kajian mengenai sakit belakang dalam kalangan generasi muda adalah terhad di Malaysia di sebalik peningkatan insiden kondisi ini di seluruh dunia. Kajian keratan rentas ini bertujuan mengenal pasti insiden sakit belakang dan faktor risikonya dalam kalangan prasiswazah sains kesihatan. Soal-selidik kajian diedar kepada prasiswazah sepenuh masa sebuah universiti tempatan. Sejumlah 140 prasiswazah; min umur 21.4±1.3 tahun, 70% perempuan, 60% dalam tahun 3 pengajian telah mengambil bahagian di dalam kajian ini. Hasil kajian menunjukkan bahawa 31% daripada prasiswazah menghabiskan sejumlah 6 hingga 8 jam sehari dalam posisi duduk manakala dalam kalangan 31% lagi prasiswazah, jumlah masa berada dalam posisi duduk dalam sehari melebihi 9 jam. Dua belas peratus daripada prasiswazah menilai tahap kecergasan mereka sebagai 'rendah'. Insiden sakit belakang dalam kalangan prasiswazah ini ialah 40.3%. Sakit belakang didapati berkait dengan faktor umur (X^2=12.1, p=0.007), tempoh pengajian (X^2=8.7, p=0.03), tahap kecergasan fizikal (X^2=7.0, p=0.02) dan tempoh duduk (X^2 =8.7, p=0.03). Jantina, indeks jisim tubuh dan tempoh aktiviti fizikal dan sukan tidak berkait dengan sakit belakang. Keputusan ini menunjukkan peranan kecergasan fizikal dan tempoh duduk terhadap insiden sakit belakang dalam kalangan prasiswazah sains kesihatan. Prasiswazah perlu meningkatkan kecergasan fizikal dan mengamalkan rehat dan regangan yang kerap sewaktu duduk bagi meminimumkan risiko sakit belakang akibat penurunan tahap kecergasan dan duduk yang terlalu lama.

Kata kunci: Duduk yang lama; kecergasan fizikal; prasiswazah; sakit belakang

INTRODUCTION

Low back pain (LBP) is a social and economic health problem that affects population of all ages globally. Studies have reported that approximately 12-80% of younger population, mainly students experience LBP (Burton et al. 1996; Jones & Macfarlane 2005; Korovesis et al. 2010, Pellisé et al. 2009; Smith & Leggat 2007). Functional disability associated with LBP might not be the main concern in a younger population. However, experiencing it earlier in life may lead to recurrent (Harreby et al. 1995) and chronic LBP (Brattberg 1994) in adulthood.

There is abundance of information regarding prevalence of LBP among university students, many of whom are health professional students. A review on LBP risk factors among these students concluded that there was diversity in risk factors examined and the results were inconsistent (Smith & Leggat 2007). Identified LBP risk factors included, gender, age, posture, smoking,

psychosocial factors, general health status, duration of computer usage, physical activity levels and history of prior LBP experience (Smith & Leggat 2007).

To date, there is limited evidence to recommend suitable prevention strategies of LBP in younger populations. Presently, modifying the risk factors associated with LBP is advocated as the most important prevention strategy in school children and adolescents (Burton et al. 1996). The prevention strategy of LBP can only be successful if its contributory and associated risk factors are identified and better understood. In the Malaysian context, studies on LBP have focused on working adults (Singh & Noor Hassim 2006; Rozali et al. 2009; NurulIzzah et al. 2010) and school children (Tamrin et al. 2004). Not much is known about the incidence of this potentially disabling condition among young adults such as undergraduates. The aim of this study was to determine the incidence of LBP and identify the associated risk factors among health science undergraduates. The new roles taken by health science undergraduates, for example health promoting behavior, manual handling and working postures may potentially expose them to occupational risks that may cause LBP.

Methods

A cross-sectional survey was conducted among health science undergraduates studying full time at the Universiti Kebangsaan Malaysia. Ethical approval was granted by the university's Research Ethics Committee. Participants were recruited from within the Faculty of Health Sciences of the university with the use of flyers distributed by the researchers. Participants were excluded if they had any known spinal deformities such as scoliosis, spondylolisthesis, spondylosis, spondylolisis, spinal stenosis, prolapsed interveterbral disc and any neurological deficits and history of LBP 6 months prior to enrollment in this study that required medical management.

A self-administered questionnaire that was adapted from other studies (Feldman et al. 2001; Levangie 1999; Nyland & Grimmer 2003) was used. This questionnaire was piloted for clarity on ten students before administration in this study. No amendments on the questionnaire were required following the pilot study and responses from the ten students were included in the main study. The questionnaire was organised into three parts; Part 1 consisted of demographic information, Part 2 collected details of LBP experience since studying at the faculty and Part 3 gathered data regarding the risk factors that included self-rated fitness level, hours spent sitting and hours spent for sports or structured physical activities. The undergraduates were approached during their attendance at the faculty's common lecture sessions. Verbal explanation of the study was provided prior to distribution of the questionnaire. Informed consent was inferred by voluntary completion and return of the questionnaire.

Statistical analysis of the data was performed using SPSS software version 16 (SPSS Inc. Chicago, USA). Descriptive statistics were used to summarise the participants' demographic information and the incidence of LBP. Chi square test was performed to determine the association between the investigated risk factors and LBP. Statistical tests at $p<0.05$ were considered as significant.

Results

One hundred and forty four students responded to the survey and their demographic data is as reported in Table 1. The mean age ± (standard deviation) of the participants was 21.47 ± 1.36 years. Majority of the participants were females (70%) and year three students (60%). Among the participants, 41% were not involved in any sports or structured physical activities. Most participants (66%) rated their physical fitness level as moderate, while 12% and 22% rated as poor and good, respectively. Thirty one percent of the participants were sitting between 6 and 8 h per day and another 31% were sitting more than 9 h per day. Only 17% were sitting less than 4 h a day and 21% between 4 and 6 h per day.

The results of the incidence of LBP and associated risk factors are as shown in Table 2. A total of 59.7% participants had not experienced LBP with 40.3% reporting otherwise. The risk factors that were significantly associated with LBP were age (X^2 =12.1, p=0.007), years of study (X^2=8.75, p=0.03), fitness level (X^2 =7.0, p=0.02) and hours spent sitting (X^2=8.7, p=0.03). Higher incidence of LBP (>60.0%) was observed among students who were 23 years and older, had studied for more than 3 years and had been sitting for more than 4 h per day; while lower LBP incidence (17.6%) was noted among students with good fitness level. Gender, body mass index, hours involved in sports or structured physical activities were not significantly associated with LBP (Table 2).

Discussion

The objective of this study was to determine the incidence of LBP and identify the associated risk factors among health science undergraduates. A survey questionnaire examining the associated risk factors of LBP among health science undergraduates was administered among health science undergraduates. The results demonstrated that physical fitness and hours spent sitting per day were associated with LBP. The reported prevalence of LBP among health science students in other countries were between 13.5 and 64.6% (Kamwendo 2000; Leggat & Smith 2006; Leggat et al. 2008; Rising et al. 2005). The results of the present study showed that approximately 40.1% of the students were currently experiencing or have had LBP. The result suggests that incidence of LBP among health science undergraduates at this institution was at a higher end compared with the previous reported prevalence.

Disparity in the prevalence is possible depending on the differences of inter student, faculty year of studies and cross cultural factors (Legat et al. 2008). It should be noted that the present study involved all health science undergraduates from year 1 to 4. The amount of health

TABLE 1. Participants demographic data (*n*=144)

Characteristics	N(%) or mean (SD)
Age	21.4±1.3
Gender	
Male	43(29.9)
Female	101(70.1)
Body mass index	
<18.50	36(25.0)
18.5-22.9	80(55.6)
>23	28(19.4)
Year of studies	
Year 1	20(13.9)
Year 2	19(13.2)
Year 3	79(54.9)
Year 4	26(18.1)
Hours involved in physical activity /per week	
Nil	59(41.0)
1-10 h	75(52.0)
>10 h	10(7.0)
Self-rated current physical fitness	
Poor	32(22)
Moderate	95(66)
Good	17(12)
Hours spent sitting / per day	
<4 h	25(17.3)
>4 ≤ 6 h	31(21.5)
>6 ≤ 8 h	44(30.6)
≥ 9 h	44(30.6)

promoting behavior may also have influenced the results of the present study. For example, the involvement of physiotherapy undergraduates in health promoting behavior may be more physical, frequent and regular compared with undergraduates from biomedical sciences. The incidence of LBP among physiotherapy undergraduates were reported to be 69.2% in Australia (Nyland & Grimmer 2003).

Age was demonstrated to have a significant association with LBP. These results are consistent with previous reports regarding an increased prevalence of LBP with age (Bernard et al. 2008; Poussa et al. 2005; Shebab & Al-Jarullah 2005). Concurrently, years of study also has a significant association with LBP in the study. This can be expected as undergraduates with more years in study are generally older in age. Another possible explanation may be due to the number of years in practising health promoting behavior. This is supported by a study whereby the final year undergraduates had a higher LBP incidence (Nyland & Grimmer 2003).

In the present study, lower incidence of LBP was noted among the undergraduates who had good fitness level. Jones and Macfarlane (2005) reported that a moderate level of physical activity was associated with general conditioning effect that may reduce the risk of LBP. In contrast, LBP and physical fitness association in young adults were reported as not significant in a few previous studies (Anderson et al. 2006; Nyland & Grimmer 2003). This discrepancy may be as a result of using self- reported physical fitness in the present study. Self-reported methods, which are totally dependent on ones' perception, can lead to over or under-reporting of an event.

In working adults, prolonged sitting has been identified as a risk factor for LBP (Lis et al. 2007). The reported consequences of prolonged sitting are increased spinal compression load (Callaghan & McGill 2001) and increased activity of paraspinal muscles (Harrison et al. 1999). As a result, LBP can occur due to tissue micro-damage and paraspinal muscle dysfunction (Solomonow et al. 2003). Theoretically, these negative implications can also be generalised to younger adults' spines. A significant association between LBP and hours spent sitting per day in this study is in keeping with the reasoning and the results of a previous study (Nyland & Grimmer 2003).

Gender and hours involved in sports or physical activity per week were found to have no significant association with LBP. Although females had a higher incidence of LBP, the results demonstrated no significant differences between genders (Kopec et al. 2003). In contrary, females and sitting posture was reported as related factors for LBP (O'Sullivan et al. 2011). In relation to duration engaged in sports or physical activity and its association between LBP, no significant association between these two factors was demonstrated (Anderson et al. 2006; Feldman et al.

TABLE 2. LBP incidence and associated risk factors among the study participants

Characteristics	Reported LBP		Chi-square results
	Yes, N(%)	No, N(%)	X^2, p
All participants	58(40.3)	86(59.7)	
Age			12.11, 0.007*
≤20	16(48.5)	17(51.5)	
21	10(23.3)	33(76.7)	
22	15(36.6)	26(63.4)	
≥23	17(63.0)	10(37.0)	
Gender			1.52, 0.22
Male	14(32.6)	29(67.4)	
Female	44(43.6)	57(56.4)	
Years of study			8.75,0.03*
1	6(30.0)	14(70.0)	
2	10(52.6)	9(47.4)	
3	26(32.9)	53(67.1)	
4	16(61.5)	10(38.5)	
BMI			1.36, 0.50
<18.50	14(38.9)	24(61.1)	
18.5-22.9	30(37.5)	50(62.5)	
>23	14(50.0)	14(50.0)	
Time spent for physical activities per week			0.67, 0.71
Nil	23(39.0)	36(61.0)	
1-10 h	32(42.7)	43(57.3)	
>10 h	3(30.0)	7(70.0)	
Self-rated fitness level			7.08, 0.03*
Poor	18(56.3)	14(43.7)	
Moderate	37(38.9)	58(61.1)	
Good	3(17.6)	14(82.4)	
Time spent sitting per day			8.77, 0.03*
<4 h	6(24.0)	19(76.0)	
>4 ≤ 6 h	19(61.3)	12(38.7)	
>6 ≤ 8 h	28(63.6)	16(36.4)	
≥ 9 h	27(61.4)	17(38.6)	

*p significant at <0.05

2001; Moroder et al. 2011; Nyland & Grimmer 2003). However, studies involving school children suggested that sports activities such as soccer and swimming reduces the occurrence of LBP (Skoffer & Foldspang 2008). In fact, staying active is advocated as a preventive and curative strategy against LBP in evidence based practice (Liddle et al. 2007).

No significant association was shown between BMI and LBP. Similar results were also reported previously (Chung et al. 2005; Grimmer & Williams 2000; Levangie 1999) with a systematic review concluding a weak association (Leboeuf-Yde 2000). It is believed that the rapid changes of weight in a short period of time may not have an effect on the low back of younger adults (Grimmer & Williams 2000). A significant positive association (p<0.03) was found between body mass index, pain and disability in an adult population with LBP findings in a recent study that included participants who were categorized as obese (Urquhart et al. 2011).

In conclusion, age, years of study, physical fitness and hours spent sitting per day were found to be associated with LBP among health science students. Even though this study involves a questionnaire, it adds to the body of knowledge regarding LBP and its risk factors among Asian health science students. Physical fitness and prolonged sitting are modifiable risk factors that should be addressed by clinicians in prevention of LBP among young adults. Undergraduates should practice frequent breaks from sitting and regular stretches to minimize occurrences of LBP related to prolonged sitting. They should also be encouraged to adopt and maintain physical fitness. Physical activity can be integrated into daily routine whenever possible, such as walking to the university instead of travelling in a vehicle and taking stairs instead of lifts to

maintain a healthy lifestyle behavior. Future studies are required to examine larger subsamples of health science undergraduates from different disciplines and geographical areas for generalisation of results.

REFERENCES

Anderson, L.B., Wedderkopp, N. & Leboeuf-Yde, C. 2006. Association between back pain and physical fitness in adolescents. *Spine* 31(15): 1740-1744.

Bernard, J.C., Bard, R., Pujol, A., Combey, A., Boussard, D., Begue, C. & Salghetti, A.M. 2008. Muscle assessment in healthy teenagers, comparison with teenagers with Low back pain. *Ann. Readapt. Med. Phy.* 51: 263-283.

Brattberg, G. 1994. The incidence of back pain and headache among Swedish school children *Qual. Life Res.* 3(1): S27-S31.

Burton, A.K., Clarke, R.D., McClune, T.D., Tomothy, D. & Tillotson, K.M. 1996. The natural history of low back pain in adolescents. *Spine* 21(20): 2323-2328.

Callaghan, J.P. & McGill, S.M. 2001. Low back joint loading and kinematics during standing and unsupported sitting. *Ergon* 44: 280-294.

Chung, Y.L., Kratter, R., Duvoisin, N., Taskin, N.D.A. & Schilling, J. 2005. Cross-sectional view of factors associated with back pain. *Int. Arch. Occup. Environ. Health* 78: 319-324.

Feldman, D.E., Shrier, I., Rossignol, M. & Abenhaim, L. 2001. Risk factors for the development of low back pain in Adolescence. *Am. J. Epidemiol.* 154(1): 30-36.

Grimmer, K. & Williams, K. 2000. Gender-age environment associates of adolescent low back pain. *Appl. Ergon.* 31: 343-360.

Harreby, M., Neergaard, K., Hesselsøe, G. & Kjer, J. 1995. Are radiologic changes in the thoracic and lumbar spine of adolescents risk factors for low back pain in adults? A 25-year prospective cohort study of 640 school children. *Spine* 20(21): 2298-2302.

Harrison, D.D., Harrison, S.O., Croft, A.C., Harrison, D.E. & Troyanovich, S.J. 1999. Sitting biomechanics part I: Review of the literature. *J. Manip. Physiol. Ther.* 22: 594-609.

Jones, G.T. & Macfarlane, G.J. 2005. Epidemiology of low back pain in children and adolescents. *Arch. Dis. Child.* 90: 312-316.

Kamwendo, K. 2000. Adherence to healthy lifestyles: A comparison of occupational therapy students with nursing and physiotherapy students. *Scand. J. Occup. Ther.* 7: 156-164.

Kopec, J.A., Sayre, E.C. & Esdaile, J.M. 2003. Predictors of back pain in a general population cohort. *Spine* 29(1): 70-78.

Korovessis, P., Repantis, T. & Baikousis, A. 2010. Factors affecting low back pain in adolescents. *J. Spinal Disor. Tech.* 10: 1-8.

Leboeuf-Yde, C. 2000. Body weight and low back pain: A systematic literature review of 56 journal articles reporting on 65 epidemiologic studies. *Spine* 25(2): 226-237.

Leggat, P.A. & Smith, D.R. 2006. Musculoskeletal disorders self-reported by dentist in Queensland, Australia. *Aust. Dent. J.* 51: 324-327.

Leggat, P.A., Smith, D.R. & Clark, M.J. 2008. Prevalance and correlates of low back pain among occupational therapy students in Northern Queensland. *Can. J. Occup. Ther.* 759(1): 35-31.

Levangie, P.K. 1999. Association of low back pain with self-reported risk factor among patients seeking physical therapy services. *Phys. Ther.* 79(8): 757-766.

Liddle, S.D., Gracey, J.H. & Baxter, G.D. 2007. Advice for the management of low back pain: A systematic review of randomised controlled trials. *Man. Ther.* 12(4): 310-327.

Lis, A.M., Black, K.M. & Korn, H. 2007. Association between sitting and occupational low back pain. *Eur. Spine J.* 16: 283-298.

Moroder, P., Runer, A., Resch, H. & Tauber, M. 2011. Low back pain among medical students. *Acta Orthop. Belg.* 77: 88-92.

NurulIzzah, A.S., Haslinda, A. & Saidi, M. 2010. Prevalence of low back pain and its risk factors among school teachers. *Amer. J. Appl. Sci.* 7(5): 634-639.

Nyland, L.J. & Grimmer, K.A. 2003. Is undergraduate physiotherapy student a risk factor for low back pain? A prevalence study of low back pain in physiotherapy students. *BMC Musculoskelet Disord* 4(21): 1-8.

O'Sullivan, P.B., Smith, A.J., Beales, D.J. & Straker, L.M. 2011. Association of biopsychosocial factors with degree of slump in sitting posture and self-report of back pain in adolescents: A cross-sectional study. *Phys. Ther.* 91(4): 470-483.

Pellisé, F., Balaguê, F., Rajmil, L., Cedraschi, C., Aguirre, M., Fontecha, C.G., Pasarin, M. & Ferrer, M. 2009. Prevalance of low back pain and its effect on health-related quality of life in adolescents. *Arch. Pediat. Adol. Med.* 163(1): 65-71.

Poussa, M.S., Heliövaara, M.M., Seitsamo, J.T., Könönen, M.H., Hurmerinta, K.A. & Nissinen, M.J. 2005. Anthropometric measurements and growth as predictors of low back pain: A cohort study of children followed up from the age of 11 to 22 years. *Eur. Spine. J.* 14: 595-598.

Rising, D.W., Bennett, B.C., Hursh, K. & Plesh, O. 2005. Reports of body pain in dental student population. *J. Am. Dent. Assoc.* 136: 81-86.

Rozali, A., Rampal, K.G. & Shamsul Bahri, M.T. 2009. Low back pain and association with whole body vibration among military armoured vehicle drivers in Malaysia. *Med. J. Malaysia* 64(3): 197-204.

Shebab, D.K. & Al-Jarullah, K.F. 2005. Non-specific low back pain in Kuwait children and adolescents: Associated factors. *J. Adol. Health* 36: 32-35.

Singh, J. & Noor Hassim, I. 2006. A study of prevalence of low back pain among workers of Dunham-Bush Industries Sdn Bhd Kajang Selangor. 1998. *Malaysian J. Comm. Health* 12(1).

Skoffer, B. & Foldspang, A. 2008. Physical activity and low back pain in school children. *Eur. Spine J.* 17: 373-379.

Smith, D.R. & Leggat, P.A. 2007. Back pain in the young: A review of studies conducted among school children and university students. *Curr. Pediat. Rev.* 3: 69-77.

Solomonow, M., Bratta, R.V., Zhou, B.H., Burger, E., Zieske, A. & Gedalia, A. 2003. Muscular dysfunction elicited by creep of lumbar viscoelastic tissue. *J. Electromyogr. Kinesiol.* 13: 381-396.

Tamrin, S.B., Abdullah, M.Y. & Hamzah, R. 2004. School bag load and its effect on the erector spinae muscles and low back pain among primary school children in Malaysia. *Malaysian J .Med. Health Sci.* 1(1): 21-31.

Urquhart, D.M., Berry, P.B., Wluka, A.E., Strauss, B.J., Wang, Y., Proietto, J., Jones, G., Dixon, J. & Cicuttini, F. 2011. Increased fat mass is associated with high levels of low back pain intensity and disability. *Spine* 36(16): 1320-1325.

Physiotherapy Program, School of Rehabilitation Sciences
Faculty of Health Sciences
Universiti Kebangsaan Malaysia, Jalan Raja Muda Aziz
50300 Kuala Lumpur
Malaysia

*Corresponding author; email: devinderkas@gmail.com

Received: 9 January 2013
Accepted: 17 July 2013