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Original article

Nonspecific low back pain in young adults: Associated risk factors

Rita Neli Vilar Furtado[a,*], *Luiza Helena Ribeiro*[a,b], *Bruno de Arruda Abdo*[b], *Fernanda Justo Descio*[b], *Celso Eduardo Martucci Junior*[b], *Débora Coutinho Serruya*[b]

[a] *Universidade Federal de São Paulo, São Paulo, SP, Brazil*
[b] *Universidade Nove de Julho, São Paulo, SP, Brasil*

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ABSTRACT

Objective: The aim of the study was to evaluate potential risk factors related to low back pain in the daily routines of two sets of youths: individuals complaining of chronic low back pain and a control group.
Methods: The sample consisted of 198 university-age students (male and female) aged between 18 and 29. In accordance with back pain diagnoses, they were separated into two groups: with or without nonspecific chronic low back pain. Both groups were evaluated by a "blinded" observer with no knowledge to the presence or otherwise of lower back pain. Questionnaires concerning clinical-demographic characteristics, life style, quality of life (SF-36 questionnaire), pain visual analogical scales (VAS), and physical examination were applied.
Results: A univariate analysis showed a statistically significant association ($P < 0.05$) with the presence of low back pain and some factors. There was a negative association between low back pain and the following variables: BMI, health self-assessment, VAS and some SF-36 domains (physical functioning, body pain, general health, vitality, social functioning). There was a positive correlation with the following variables: global pain by VAS, presence of diffuse pain and number of tender points. However, the multivariate analysis showed statistically significant correlations ($P < 0.05$) between low back pain and few variables: global pain VAS and number of tender points.
Conclusion: Some variables related to chronic diffuse pain and lower quality of life might be associated to chronic low back pain in young adults. However, longitudinal studies are necessary.

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* Corresponding author.
E-mail: rvfurtado@hotmail.com (R.N.V. Furtado).
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Dor lombar inespecífica em adultos jovens: fatores de risco associados

Palavras-chave:
Dor lombar
Adultos jovens
Fatores de risco

RESUMO

Objetivo: O objetivo do estudo foi avaliar fatores de risco potenciais para dor lombar na rotina diária de dois grupos de jovens: indivíduos com queixa de dor lombar e um grupo de controle.

Métodos: A amostra consistiu de 198 estudantes em idade universitária (homens e mulheres), entre 18 e 29 anos. De acordo com os diagnósticos de dor nas costas, os participantes foram separados em dois grupos: com ou sem dor lombar crônica inespecífica. Ambos os grupos foram avaliados por um observador "cego", i.e. desconhecedor da presença ou de qualquer outra indicação de dor lombar. Foram aplicados questionários relativos às características clínico-demográficas, estilo de vida, qualidade de vida (questionário SF-36), dor pela escala visual analógica (EVA) e exame físico.

Resultados: Uma análise univariada demonstrou uma associação estatisticamente significativa ($p < 0,05$) entre presença de dor lombar e alguns fatores. Houve uma associação negativa entre dor lombar e as seguintes variáveis: IMC, autoavaliação da saúde/EVA e alguns domínios do SF-36 (função física, dor corporal, saúde em geral, vitalidade, função social). Houve uma correlação positiva com as seguintes variáveis: dor global por EVA, presença de dor difusa e número de pontos sensíveis. Contudo, a análise multivariada demonstrou correlações estatisticamente significativas ($p < 0,05$) entre dor lombar e poucas variáveis: dor global por EVA e número de pontos sensíveis.

Conclusão: Algumas variáveis relacionadas à dor difusa crônica e à má qualidade de vida podem estar associadas à dor lombar crônica em adultos jovens. Mas há necessidade de estudos longitudinais.

Introduction

Low back pain is currently one of the most widespread public health problems faced by the industrialized world, as it affects a large portion of the population and constitutes a heavy burden on national health and welfare systems in terms of diagnostics, treatment, absenteeism and early retirement. Added to that is the psychosocial impact caused by the untimely withdrawal of otherwise active people from their daily activities.[1,2]

It is estimated that roughly 80% of the population ends up suffering from back pain at some point in their lives. The occurrence of acute low back pain is high, with somewhere between 15% and 30% of the population developing this condition, mostly in adulthood. That said, epidemiological studies have shown an increase in mechanical lumbago in children, teenagers and young adults. Estimates put accumulated prevalence in this population at 30%.[3–5]

The secondary causes of lumbago in the younger population has always been a medical concern, as it is considered a "red flag" when back pain affects this age group. However, nonspecific low back pain is still the main cause among this population.[5]

Previous studies have detected what are considered to be risk factors potentially leading to the development of nonspecific back pain among children and teenagers. Among these are biomechanical alterations to the spine caused by mechanical overburdening (heavy school bags, for example), incorrect posture and ergonomic characteristics of school chairs and desks.[6–12]

The development of nonspecific back pain can also be traced back to the practice of certain sports during childhood and/or adolescence.[13–22]

As with back pain among the adult population, other risk factors for the development or worsening of lumbar pain among the young are sedentarism, smoking and psychosocial alterations.[13–17]

The aim of the present study is to evaluate the existence of potential risk factors related to low back pain or alterations in physical examination in the daily routines of two sets of youths, one consisting of individuals complaining of chronic low back pain, and the other, a control group, with no such complaint.

Methods

We collected a representative sample of 198 university-age students in São Paulo, Brazil. The sample consisted of males and females aged between 18 and 29. Individuals with prior diagnosis of some spinal illness or low back pain suggestive of secondary causes, sciatica sufferers and those who had previously undergone spinal surgery were excluded from the study.

As diagnostic criteria for nonspecific chronic low back pain, we used the persistence of pain over a period of three months, in a region of the back between the lowermost rib and the gluteal fold.[18]

In accordance with chronic low back pain diagnoses, subjects were separated into two groups:

Group 1: Individuals with nonspecific chronic low back pain (NL)
Group 2: Individuals not suffering from nonspecific chronic low back pain (NNL). This group included those not suffering from nonspecific chronic low back at the time of the study, and those who had never presented the symptoms of chronic lumbago.

The individuals were picked and randomly included in the study.

Evaluation

Initially, the participants were asked to fill in a self-assessment form and were then evaluated by a "blinded" observer with no knowledge to the presence or otherwise of lower back pain. Questionnaires concerning the lumbar region were applied and physical examinations were conducted, as were tender points for "Fibromyalgia".

The self-assessment form furnished the following information:

- Clinical demographic characteristics: color, gender, age, weight and height;
- Lifestyle and habits: smoking, the use of alcohol or illicit drugs, physical exercise;
- Personal and family backgrounds with regard to low back pain;
- Aspects related to mental health: anxiety, emotional instability, sleep disturbances.
- Visual analogue scale for low back pain: 0-10 cm (VAS low back pain)
- General pain survey: notification of diffuse pain and headache; visual analogue scale for diffuse pain: 0-10 cm (VAS diffuse pain); notification of the use of analgesic medications.

The following outcome variables were applied by the observer blinded to the groups:

- Visual analogue scale for general health assessment: 0-10 cm (VAS general health)
- SF-36 Health Survey: quality of life questionnaire[19]
- Standing toe-touch test: to assess flexibility of lumbar region
- Schober's Test: to test ability to flex lower back
- Number of tender points: eighteen points in total

Statistical Analysis

To compare the clinical demographic characteristics and behavioral factors of the two groups we used *Student's t* test, to analyze continuous variables, and the chi-square test, to analyze categorical variables.

To evaluate the association between each variable considered a possible risk factor for low back pain and the presence of lower back pain, we used a univariate analysis. Those factors for which statistically significant coefficients were obtained were analyzed in conjunction through multivariate analysis.

Table 1 – Clinical demographic characteristics.

	NL Group (n)	NNL Group (n)	p
Age (mean)	22,2	23,1	0,07
Gender M:H	47:11	82:58	0,004
Race (mulatto/white) (%)	52	132	0,9
BMI	21,7	23,4	0,001
Smoking (%)	15	38	0,99
Alcohol consumption (%)	31	76	0,96
Drug use (%)	13	32	0,90
Physical exercise (%)	10	43	0,07

Statistical Test, chi-square.

A 5% ($p < 0.05$) level of significance was adopted for all the tests.

Results

A total of 198 young adults were examined, 129 women and 69 men, with an average age of 22.9 years. Of this number, 193 (97%) were white or mulatto (Table 1). Fifty-eight individuals were diagnosed as suffering from nonspecific chronic low back pain (group NL), while 140 presented no such condition (group NNL). The VAS average for group NL was 4.92. The clinical demographic characteristics of the two groups can be seen in Table 1. There was a difference in percentage of females between the two groups (greater in NL) and in terms of BMI (higher in NNL).

Comparisons between groups NL and NNL did not reveal any statistically significant differences in relation to the proposed behavioral risk factors, such as smoking, alcohol intake, drug use, or physical exercise. However, there was a statistical trend associating the absence of chronic low back pain with the practice of physical exercise (Table 1).

However, we did find significant differences between the groups according to the following outcomes, for group NL, female ($p < 0.05$); lower BMI (0.001) and previous history of back pain ($p = 0.003$); low scores on health self-assessment ($p < 0.0001$); familial history of back pain ($p = 0.003$); chronic headaches ($p = 0.002$); chronic use of analgesics (< 0.001); diffuse pain ($p = 0.025$); VAS for diffuse pain ($p = 0.01$); number of tender points ($p \leq 0.001$); morning stiffness in the spine ($p = 0.02$) and low quality of life according to SF-36 domains: physical functioning, body pain, general health, vitality, social functioning ($p = 0,01$). Though not statistically significant, there was a tendency toward higher quality of life in the role physical and mental-health domains of the SF-36 (Tables 1–4).

The tests analyzed by lower back flexibility (toe-touch and Schober) did not reveal any statistically significant difference between the two groups (Table 2).

To assess the correlation between possible risk factors and the presence of chronic low back pain, a univariate analysis was done. Some factors showed a statistically significant correlation with the presence of low back pain. There was a negative correlation between chronic low back pain and the following variables: BMI, health self-assessment VAS, SF-36 domains (role-physical, social functioning, body pain, general

Table 2 – Outcome measures related to back pain.

	NL Group (n = 58)	NNL Group (n = 140)	p
Previous back pain (%)	19	21	**0,0008**
Familial back pain(%)	36	53	**0,003**
Schober's test mean (± SD)	4,73 (±1,24)	4,86 (±2,17)	0,66
Toe touch (cm) mean (± SD)	10,3 (± 11,3)	8,76 (±9,55)	0,33
Morning Stiffness (%)	25	9	**0,02**
VAS back pain mean (± SD)	4,92 (2,03)	0	–
Analgesics intake (%)	25	6	**<0,0001**

Statistical Tests: Student's T; Qui square

Table 3 – Outcome measures related to chronic pain.

	NL Group	NNL Group	p
Diffuse pain (%)	18	22	**0,02**
Headache (%)	23	25	**0,002**
VAS diffuse pain mean (SD)	2,85 (±3,13)	1,80 (2,31)	**0,01**
Tender points mean (SD)	4,81(±3,94)	1,91 (± 2,55)	**<0,0001**

Statistical Tests: Student's T; Qui square

Table 4 – Outcome measures related to general health.

	NL Groupn = 58	NNL Groupn = 140	p
Anxiety (%)	49	104	0,17
Sleep disturbance (%)	23	42	0,25
Emotional instability (%)	8	21	0,99
VAS gereral health mean (SD)	7,36 (±1,72)	7,93 (± 1,18)	**<0,0001**
SF 36 Domais mean (SD) Physical Functioning	84,9 (±16,8)	92,20 (±9,17)	**<0,0001**
Role Physical	78,8 (± 26,6)	85,8 (± 25,36)	0,084
Body Pain	59,6 (± 17,3)	79,5 (±17,6)	**<0,0001**
General Health	66,12 (± 20,16)	74,65 (±15,20)	**0,001**
Vitality	52,36 (± 18,07)	62,48 (±18,20)	**<0,0001**
Social Functioning	69,28 (± 24,58)	80,24 (± 21,53)	**0,002**
Role Emotional	69,67 (±38,69)	86,38 (± 51,54)	0,22
Mental Health	64,90 (±18,87)	69,77 (±16,06)	0,06

Statistical Tests: Student's T; Qui square

Table 5 – Nonspecific chronic low back pain associated factors. Univariate and multivariate analysis.

	univariate analysis CC	p	multivariate analysis CC	p
BMI	0,846	**0,003**		
VAS: Health self evaluation	0,971	**0,053**		
VAS: global pain	1,18	**0,005**	0,732	**0,006**
Diffuse pain	2,57	**0,009**		
Tender points	1,322	**0,001**	1,19	**0,016**
SF-36 domains				
Role physical	0,922	**0.001**		
Social functioning	0.981	**0.003**		
Body Pain	0.945	**<0.001**		
General Health	0.971	**0.002**		
Vitality	0.981	**0.001**		

Statistical Tests: Univariate and multivariate analysis.
CC: Correlation coefficient

health, and vitality). There was a positive correlation with the following variables: global pain VAS, presence of diffuse pain and number of tender points (Table 5).

These variables, found to have statistically significant correlations in univariate analysis, were then subjected to multivariate analysis, which drew statistically significant correlations between chronic low back pain and the following variables: global pain VAS and number of tender points (Table 5).

Discussion

Most studies on back pain among younger age groups largely focus on secondary-cause occurrences of the condition, especially those related to inflammatory diseases.[5]

Recent studies have shown that biomechanical and psychosocial factors also play an important role in the genesis of low back pain among young and old alike, most of them focus on children and teenagers.[20,23]

However, it is very important to study the young population, because treating low back pain during this phase of life can be crucial to preventing these individuals from developing acute lumbago at a later stage.[15]

The present study observed that associations exist between chronic low back pain and the following clinical demographic variables: "female gender" and "previous history of back pain", thus corroborating data already obtained in the literature on chronic low back pain among adults.[20,21]

However, although our study found a higher percentage of familial history of back pain for chronic low back pain group, the literature does not reveal any association between them. Nevertheless, information obtained from the subjects depends on their knowledge of family backgrounds in this regard.

On the other hand, some recent papers have suggested a possible association between back pain and genetic factors.[22–25]

We identified a positive statistical association between chronic low back pain and other occurrences of chronic pain, such as headache and the presence of tender points, as well as indirect findings related to pain in general, such as chronic use of analgesics. The association between chronic pain of different origins has already been demonstrated in other studies, suggesting an important role played by neuromodulatory aspects in the onset and perpetuation of chronic pain.[26–28]

Jones *et al.* classified potential risk factors for low back pain in children and teens as per the following four categories: anthropometric variables, lifestyle factors, the overburdening of joints and psychosocial and behavioral factors.[29] Recent studies have shown that psychosocial factors are strongly related to self-reporting of low back pain among children.[28–30]

Some studies conducted on adults have found an association between certain pain syndromes, such as back pain, pelvic pain, irritable bowel syndrome and complaints of generalized pain.[31–33] This association would seem to be related to the stimulation of the central nervous system through peripheral nociceptors.[34,35] In addition to these, central inhibitory and facilitating mechanisms are involved in the spreading of pain, as are cortical and subcortical processes related to chronic pain.[36]

Chronic pain can also reflect negatively upon life quality, as demonstrated by our study, on which we identified a correlation between a bad assessment of aspects of quality of life (role physical, body pain, general health, vitality and the social functioning) and the presence of low back pain.

A sedentary lifestyle is considered a low back pain risk factor among the general population, but it is also known that children and youths who do not practice physical exercise are far more likely to become sedentary adults.[37,38]

However, some studies show an association between the practice of certain physical activities and the development of low back pain.[13–22] Studies assessed back pain-related risk factors among young athletes, and these were related to certain structural causes, such as disc herniation and spondylolysis, brought on by excessive stretching, flexing and rotation of the spine, and overburdening of the posterior elements of the spine, usually through the hyperlordosis that affects certain groups of athletes, especially gymnasts.[13,39,40]

In a 25-year cohort study with children and teens aged between 12 and 17, the authors evaluated the development of low back pain during this period and concluded that the practice of physical exercise reduces the risk of developing low back pain.[41]

In the present study, we identified a low percentage of physical exercise among the NL group (17%). This percentage was higher in the NNL group (30%), but without statistical difference between them. Analyzed together, the overall percentage of participants practicing physical exercise was only 26%, which means a 74% rate of sedentary.

Another risk factor known to be related to the development of low back pain in teenagers and adults is smoking. In a recently published meta-analysis, the authors found a moderate correlation between a smoking habit and lower back pain in adults. However, the authors found a stronger association between current smoking and the incidence of low back pain in adolescents than in adults.[42] In our study, we did not identify a statistically significant difference between smokers and non-smokers in relation to pain in the lumbar region. This may be accounted for by the very low number of smokers in group NL in comparison with NNL. This difference may be more pronounced in a larger sample.

On our study, when we ran simple statistical comparisons between the back pain suffers and non-sufferers in a young adult population, we observed some factors that showed a clear association with lumbar pain, namely female gender, lower BMI, personal or family history of back pain, morning stiffness in the lumbar spine, the use of analgesics, low quality of life, frequent headaches, diffuse pain and higher number of tender points. Some of these variables have been cited previously in studies conducted on adults. However, the association between lower BMI and lumbar pain that emerged from our sample was quite surprising. Studies with larger samples would have to be conducted in order to evaluate this association.

On the other hand, when we refined our statistical analysis using univariate logistic regression, we observed fewer variables vs. low back pain associations in group NL, though associations with lower BMI, poor quality of

life and variables linked with diffuse pain were corroborated.

After multivariate logistic regression analysis, the statistically significant associations that remained were a higher score for generalized or diffuse pain and a higher number of tender points. In other words, our results would suggest that young adults with chronic low back pain are those with a more perception of diffuse pain.

Patients with chronic diffuse pain, including those suffering from fibromyalgia, may present lumbar back pain as a symptom. Low back pain can be even an initial symptom of this condition in certain cases.[31,32]

In conclusion, the present study found correlations between lower back pain in young adults and some possible risk factors, such as chronic pain, low quality of life and prior history of low back pain. In a multivariate logistic regression analysis, the associations with the chronic low back pain group that remained were a higher score for generalized or diffuse pain and a higher number of tender points. As this was a transversal sample, the results must be analyzed with care, as the ideal study type by which to identify chronic low back pain risk factors would be a prospective cohort study, like the one conducted by Mikkelsson *et al.*[41]

However, we conducted a study involving a population that is seldom studied with regard to chronic low back pain, as most studies conducted on young adults focus on inflammatory diseases of the spine.

Future longitudinal studies are required in order to evaluate nonspecific back pain in youth, approaching epidemiology, risk factors and chronification. Then it will be possible to devise more specific and therefore more efficient treatment and prevention strategies.

Conflicts of interest

The authors declare no conflicts of interest.

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