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Canadian Police Force

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This study is based on a questionnaire sent to a random sample of approximately one thousand members of the Royal Canadian Mounted Police (RCMP) in order to determine their experience with low back pain and whether it differs from that of the general population, possibly as a result of the patrol car seat and the police duty belt.

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La présente étude découle d'un questionnaire administré à un échantillon aléatoire d'environ 1 000 membres de la Gendarmerie royale du Canada (GRC) dans le but de mesurer la fréquence de douleurs lombaires chez les membres. Il s'agit de déterminer si la fréquence est plus élevée chez les policiers que dans la population en général, en raison peut-être du port du ceinturon de service et de l'utilisation du siège d'autopatrouille.

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Back Pain in a Large Canadian Police Force

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Study Design. A survey of a random sample of 1002 members of the Royal Canadian Mounted Police to determine their experience with low back pain.

Objectives. To determine the prevalence of low back pain among Royal Canadian Mounted Police members and to assess the validity of the perception that the patrol car seat and the duty belt are causing a higher rate of low back pain among members of the Royal Canadian Mounted Police than in the general population.

Summary of Background Data. Low back pain is a common problem throughout the industrialized world, with reported 1-year prevalence rates between 25% and 62%. Prevalence of low back pain among people who drive motor vehicles for a significant part of the day appears higher than in the general population. Among police officers, 1-year prevalence rates of between 44% and 62% have been reported.

Methods. A computerized database of 14,897 serving regular members was used to identify a sample of officers on active duty. A low back pain questionnaire was mailed to each selected member, eliciting information regarding their experience with low back pain, their exposure to known and putative risk factors, and their opinions about the contribution of these potential risk factors. The respondents to the questionnaire remained anonymous.

Results. The response rate was 80%. The prevalence of "chronic or recurring low back pain since joining the force" was 54.9%, which is comparable with the lifetime prevalence reported for the general population. Of those who reported having back problems, only 8.5% had such problems before joining the force. Seventy-six percent who had low back pain reported having a problem within the last year, giving an overall 1-year prevalence of 41.8%, which is comparable with that for the general population. The *a priori* assumption that driving or wearing a duty belt contributed to the problem was shared by most police officers surveyed. However, only about half of the members who replied drove for more than half the working day or wore the duty belt. These members had the same prevalence of low back pain as those who did not drive or wear the duty belt.

Conclusions. The prevalence of low back pain in this police force is comparable with that in the general pop-

ulation, and driving a patrol car or wearing the duty belt does not appear to influence the prevalence rate in this population. [Key words: low back pain, police] Spine 1998;23:821-827

Low back pain is a common problem throughout the industrialized world. Lifetime prevalence is reported between 50% and 80%, with most studies reporting 50% to 60% of adults^{3,4,14,18,20,27,31,33-36,42} The recurrence rate is reported to be between 50% and 88%.^{2,3,13,16,37,38,40,43} Thus, one might expect that the prevalence of recurrent low back pain should approximate the product of these two estimates, and lie somewhere between 25% and 70%. The 1-year prevalence rate has been reported between 25% and 45%.^{3,16,20,21,25,27,31,33-35,37,41,42,44} The prevalence of low back pain among people who drive motor vehicles for a significant part of the day appears to be higher than in the general population.^{1,5-10,22-24,28,32,39} Among police officers, the lifetime prevalence rate has been reported between 33% and 75%, with a 1-year prevalence of 44% to 62%.^{11,15,30} In studies on other police forces, a significant increase has been found in the prevalence of back pain among police officers who drive for a significant part of their working day compared with those who do not drive as part of their employment.^{11,30} Body armor also has been identified as an independent risk factor,¹¹ and the duty belt has been identified as a potential cause for exacerbation of back pain. Unlike other police forces studied, the Royal Canadian Mounted Police (RCMP) uses full-size patrol cars with fully adjustable seats. Nevertheless, there exists a perception among police officers that the car seat and the duty belt are causing low back pain. The current study was designed to determine prevalence of low back pain among RCMP members and to assess the validity of the perception that the patrol car seat and the duty belt are causing a higher rate of low back pain among members of the RCMP than in the general population.

Methods

The RCMP Personnel, Administrative, Research and Development database was used to identify all officers on active duty. This system is used for administrative tracking of all members of the RCMP and is capable of generating a random sample.

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Table 1. Demographic Characteristics of Respondents (Compared With RCMP Population)

	Survey Respondents (%) (n = 805)	RCMP Population (%)
Male	88.9	88.4
Age group (yr)		
≤30	12.9	14.4
31-40	39.1	40.1
41-50	42.0	39.9
≥51	6.0	5.5
Years of service (yr)		
0-4	9.2	11.5
5-9	18.8	20.0
10-14	12.0	12.4
15-19	20.4	18.8
≥20	39.6	31.3

RCMP = Royal Canadian Mounted Police.

This computerized database was used to select a random sample of approximately 1000 serving regular members and to generate address labels and a list of members selected. Of the 14,897 serving members, 1002 were selected. With an anticipated 80% response rate, this sample size would be sufficient to estimate the responses on the back pain questionnaire within at least 5%, using 95% confidence intervals. The members selected were mailed a low back pain questionnaire that was tested on a convenience sample of RCMP members. The questionnaire was divided into three parts designed to assess their experience with back pain, exposure to known and putative risk factors, and their opinions about the contributions of these potential risk factors. The specific yes-no questions for each of these sections are summarized in Tables 2, 3, 4, and 8. The return questionnaires were reviewed for completeness and the information was entered into the statistical analysis system (SAS, SAS Institute Inc., Cary, NC) with range and logical verification checks. All questionnaire respondents remained anonymous. Estimates of the percentage occurrence of each of the study questions were calculated for those responding to the survey. Estimates of the percentage occurrence of the various workplace and nonworkplace circumstances by the current chronic or recurring back pain problems were calculated, and chi-square tests were used to compare those experiencing and those not experiencing low back pain. Student's *t* test was used to compare height, weight, and body mass index ($BMI = kg/m^2$) with the occurrence of back pain, provided the distribution assumptions underlying this test were satisfied.

■ Results

Of the questionnaires distributed, 805 were returned, yielding a response rate of 80.3%. However, not all respondents answered every question, and the number of respondents (n) answering each question is indicated in Tables 2-10. The first five questions determine the demographic characteristics of respondents. These characteristics are compared with those of the RCMP population and are presented in Table 1. The survey sample was comparable with the force in terms of overall demographics. Because the survey was anonymous, it was not possible to make a comparison between respondents and nonrespondents.

Table 2. Circumstances Related to the Workplace

	% Yes (n)
Like Your work	96.1 (798)
Engaged in special duties (e.g., Emergency Response Team)	16.0 (798)
Spend more than half of working day in a vehicle	51.0 (798)
Spend more than half of working day standing or walking	23.1 (798)
Usually wears Duty Belt (Sam Browne/Sam Black) on duty	55.9 (798)
Frequently lift or carry heavy objects	22.6 (798)
Frequent twisting movements of the trunk or legs	70.4 (796)
Experienced an accident in police car (in the past Year)	10.2 (786)
Exposure to disturbing crime or accident (in the past year)	47.4 (787)
Involved in a shooting (in the past Year)	10.6 (776)
Involved in a physical confrontation/fight/altercation (in the past Year)	48.5 (792)
Have a good working relationship with supervisor	95.9 (796)
Since joining the Force, experienced a chronic or recurrent low back pain problem	54.9 (796)

The percentage of respondents who answered affirmatively to the 10 questions about workplace circumstances is presented in Table 2. A number of important observations are immediately apparent. Most members like their work and have a good relationship with their supervisor. A little more than half of respondents drive for more than half the working day or wear the duty belt. Just over 70% replied that their daily work required frequent twisting movements of the trunk or legs. Almost half had been exposed to a crime or incident that they found emotionally disturbing. Only 10% had been involved in a shooting incident, but almost half had been involved in a physical confrontation or altercation. The percentage who reported a "chronic or recurring low back pain problem" was 54.9%.

The responses to the questions about personal experience with back pain are presented in Table 3. Three fourths of those who had experienced back problems since joining the force experienced symptoms within a year before the survey, whereas only half of these sought medical, chiropractic, or other professional help. This gives a 1-year prevalence rate of 41.8%. Only one fourth took sick leave, which was usually less than 5 days,

Table 3. One Year Experience of Back Pain Among Pain Sufferers

Within the Past Year the Respondent Has:	% Yes (n)
Suffered from a chronic or recurring low back problem	76.2 (432)
Suffered from low back pain of sufficient severity to take sick leave	24.7 (433)
Sick leave taken	
<5 working days	60.4
5-14 working days	23.4
>14 working days	16.2 (111)
Suffered from low back pain of sufficient severity to warrant sick leave, but went to work nevertheless	60.7 (435)
Sought medical, chiropractic, or other professional help	53.4 (436)

Table 4. Nonwork Circumstances

Presently the Respondent:	% Yes (n)
Participates 3 or more times per week in moderate or vigorous physical activity	67.9 (801)
Participates 2 or more times per week in stretching or muscular strengthening activities	42.8 (801)
Accumulates 3 or more hr/week in a form of physical activity that enhances health and/or physical fitness	75.3 (799)
Experienced a significant personal trauma (within the past year)	26.4 (796)
Is pregnant and in last 3 mo of pregnancy	1.2 (86)
Smoked cigarettes on a daily basis (in the past year)	16.5 (799)
Lives alone	10.5 (797)
Has one or more children less than 10 yr of age	36.9 (797)

whereas 60% reported that they probably should have taken sick leave but went to work regardless of the pain.

The responses to questions about nonworkplace circumstances are presented in Table 4. The questionnaire responses indicated that most exercise regularly, and only a minority smoke cigarettes. Approximately one third have young children at home, and very few live alone. Tables 5 through 7 demonstrate that there is no correlation in this population between the occurrence of back pain and height, weight, or BMI.

Because any program of intervention that might be implemented would require the active cooperation of individual members of the RCMP population, it was important to determine the perceived causes of back pain within this population, so that these perceptions could be addressed by the intervention program. It was also of interest to examine the relation between the perceived causes of back pain and the demonstrable causes.

Table 8 shows the responses of those who reported having "chronic or recurrent low back pain since joining the force" according to the perceived contributing causes of the pain. This table reveals that only a minority of members had back problems before joining the force. This table also examines the opinion of police officers about duty-related factors that may contribute to back pain. Examining the most common perceived causes, it

Table 5. low Back Pain and Height*

	No (cm)	Yes (cm)	t Statistic	P Value
Back pain since joining force	178.2 ± 9.1 (n = 336)	179.0 ± 8.5 (n = 408)	-1.20	0.231
Back pain in past year	179.0 ± 6.0 (n = 95)	178.9 ± 9.0 (n = 310)	0.10	0.922
Back pain in past year requiring sick leave	178.8 ± 8.9 (n = 306)	179.0 ± 7.1 (n = 100)	-0.17	0.867
Back pain in past year and should have taken sick leave	178.8 ± 6.5 (n = 159)	179.0 ± 9.5 (n = 249)	-0.25	0.802
Back pain in past year requiring medical help	179.4 ± 6.8 (n = 188)	178.5 ± 9.6 (n = 221)	1.09	0.277

* Values are mean ± standard deviation

Table 6. Low Back Pain and Weight*

	No (kg)	Yes (kg)	t Statistic	P Value
Back pain since joining force	87.1 ± 14.3 (n = 335)	86.8 ± 14.5 (n = 409)	0.28	0.777
Back pain in past year	88.0 ± 18.4 (n = 96)	86.4 ± 13.0 (n = 310)	0.91	0.366
Back pain in past year requiring sick leave	86.1 ± 12.6 (n = 306)	88.5 ± 19.3 (n = 101)	-1.43	0.154
Beck pain in past year and should have taken sick leave	85.8 ± 11.8 (n = 160)	87.3 ± 16.0 (n = 250)	-1.04	0.298
Back pain in past year requiring medical help	87.1 ± 12.6 (n = 190)	86.5 ± 16.0 (n = 221)	0.40	0.691

* Values are mean ± standard deviation.

can be seen that 82.6% believed that driving or sitting in a vehicle for long periods contributed to their back pain; 75.4% blamed the seat of the police car; 58.1% indicated that the duty belt was a contributing cause; 57.1% believed that sitting at a desk for long periods was a contributing cause; 52.4% cited twisting movements at work; 46.9% indicated getting in and out of the police car as a factor; and 39% blamed physical confrontation or altercation.

Because a high number of members indicated concern that the police car and the duty belt represented a serious contribution, and because these factors are virtually unique to police work, the population was divided between those who drive more than half the day and those who do not. The population also was examined according to whether the respondents spent more than half the day standing or walking, whether they wore the duty belt while at work, whether they lifted or carried heavy objects, whether their work involved frequent twisting of the trunk and legs, and whether they attributed the pain to a police car accident.

Table 9 provides a comparison of back pain since joining the force among members who spend more than half their day driving and members who do not. A similar comparison is provided for the duty belt and for various other aspects of police work thought to be of probable significance. It can be seen that there is no difference in the prevalence of reported back pain among members who drive compared with members who do not (54.1% vs. 55.8%; $\chi^2 = 0.2282$, $P = 0.6328$) or between members who wear the duty belt compared with members who do not (52.4% vs. 58.3%; $\chi^2 = 2.7642$, $P = 0.0963$).

The presence of perceived duty-related factors contributing to low back pain by workplace circumstances was evaluated. The results of this analysis are presented in Table 10. It is interesting to note, for example, that 86.9% of members who normally drive more than half the working day blame the car seat, whereas 64.6% of members who do not drive for half the day blame the car seat. Similarly, 81.7% of members who wear the duty

Table 7. Low Back Pain and Body Mass Index*

	No (kg/m ²)	Yes (kg/m ²)	t Statistic	P Value
Back pain since joining force	21.5 ± 7.9 (n = 335)	27.1 ± 10.1 (n = 409)	0.53	0.598
Back pain in past year	26.8 ± 6.5 (n = 96)	27.2 ± 11.0 (n = 310)	-0.32	0.752
Back pain in past year requiring sick leave	27.1 ± 11.2 (n = 306)	27.2 ± 5.8 (n = 101)	-0.12	0.902
Back pain in past year and should have taken sick leave	26.6 ± 3.7 (n = 160)	27.4 ± 12.5 (n = 250)	-0.79	0.429
Back pain in past year requiring medical help	26.5 ± 4.6 (n = 190)	27.6 ± 13.0 (n = 221)	-1.06	0.288

* Values are mean ± standard deviation.

belt consider it to be a factor contributing to their back pain, whereas 3 1.5 % of those who do not usually wear the belt consider it to be a contributor. Because virtually all members drive a police car and wear the duty belt early in their careers, it would seem that a significant number believe these early exposures are responsible for a chronic or persistent problem.

■ Discussion

This study did not ask whether the respondents had ever had low back pain. The prevalence of this condition is such that most respondents might reasonably be ex-

Table 8. Perceived Cause of Low Back Pain Among Those indicating Back Pain Since Joining the Force

Perceived Cause of Low Back Pain	% Yes (n)
Low back pain was a problem before joining the RCMP	8.5 (437)
An on-duty accident or incident involving a police vehicle	26.6 (428)
An on-duty accident or incident not involving a police vehicle	42.9 (424)
An off-duty accident or incident involving a motor vehicle	6.7 (433)
An off-duty accident or incident not involving a motor vehicle	20.7 (426)
Following duty-related factors have contributed to low back pain	
Seat in the police car	75.4 (427)
Getting into or out of the police car	46.9 (420)
Sitting at a desk for long periods	57.1 (427)
Standing for long periods	35.7 (414)
Walking for long periods	11.4 (413)
Driving or sitting in a vehicle for long periods	82.6 (426)
Current level of general physical fitness	21.3 (417)
Limited participation in regular exercise	27.6 (416)
Lack of exercise facilities at work	36.3 (421)
Duty Belt (Sam Browne/Sam Black) equipment	58.1 (422)
Uniform shoes or footwear	34.9 (424)
General fatigue	30.7 (420)
Emotional stress	28.6 (420)
Physical confrontation/altercation	39.0 (421)
Twisting movements at work	52.4 (421)
Work related lifting or carrying	36.1 (418)
Articles or equipment in back pockets while driving	25.4 (422)
Equitation training	6.7 (420)
Physical training	21.0 (420)
Special duty training (e.g., ERT, Tactical Troop)	7.9 (419)

Table 9. Workplace Circumstances by Occurrence of Chronic or Recurring Low Back Pain Problem Since Joining the Force

Question	% Yes	χ ² Statistic	P Value
Prevalence of back pain in respondents spending more than half of working day in a vehicle	54.1 (n = 403)	0.2282	0.6328
Prevalence of back pain in respondents not spending half of day in a vehicle	55.8 (n = 389)		
Prevalence of back pain in respondents spending more than half of working day standing and/or walking	48.9 (n = 182)	3.6112	0.0573
Prevalence of back pain in respondents not spending more than half of working day standing and/or walking	56.9 (n = 610)		
Prevalence of back pain in respondents wearing the Duty Belt (Sam Browne/Sam Black) on duty	52.4 (n = 443)	2.7642	0.0963
Prevalence of back pain in respondents <i>not</i> wearing the Duty Belt (Sam Browne/Sam Black) on duty	58.3 (n = 350)		
Prevalence of back pain in respondents frequently lifting or carrying heavy objects	59.8 (n = 179)	2.0875	0.1485
Prevalence of back pain in respondents not frequently lifting or carrying heavy objects	53.7 (n = 613)		
Prevalence of back pain in respondents frequently twisting the trunk or legs	55.4 (n = 554)	0.0381	0.8453
Prevalence of back pain in respondents <i>not</i> frequently twisting the trunk or legs	54.7 (n = 236)		
Prevalence of back pain in respondents occurring from an accident in a police car	55.1 (n = 78)	0.0092	0.9236
Prevalence of back pain in respondents not occurring from an accident in a police car	54.6 (n = 702)		

pected to answer in the affirmative. Moreover, it was deemed more important to know whether people in this occupation had a chronic or recurring low back problem, rather than whether the respondents had ever had a sore back. If one takes the reported lifetime prevalence of low back pain and multiplies it by the reported recurrence rate, the derived result indicates a prevalence for chronic or recurring low back pain of between 2.5 % and 70%. The prevalence rate of 54.9% “since joining the force” in this population is therefore in keeping with the lifetime prevalence in the general population for most lifetime prevalence studies.¹⁴ The 1-year prevalence rate of 41.8% in this population is comparable with that reported elsewhere, but is among the higher prevalence rates reported.^{3,14,16,20,27,31,33-35,42} These rates and the observation that prevalence increases with age,^{4,34,37,44} indicate that the working-life prevalence of chronic or recurring low back pain in this population is similar to the lifetime prevalence of back pain in the general population that is reported in the literature.

This study focused on the police car and the duty belt rather than sitting in an office, because sitting at a desk

Table 10. Presence of Perceived Duty-Related Factors (%) Contributing to low Back Pain by Workplace Circumstances

Indicated Duty-Related Factor	Workshop Circumstance		χ^2 Statistic	P Value
	Yes	No		
	Spend more than half of working day in a vehicle			
Seat in police car	86.9 (n = 273)	64.6 (n = 212)	28.5997	<0.0001
Getting in/out of car	54.8 (n = 208)	39.5 (n = 210)	9.7964	0.0017
Driving or sitting in vehicle for long periods	92.1 (n = 214)	73.3 (n = 210)	26.0680	<0.0001
	Spend more than half of working day standing/walking			
Standing for long periods	50.0 (n = 86)	31.8 (n = 372)	9.8341	0.0017
Walking for long periods	16.5 (n = 85)	9.8 (n = 327)	3.0394	0.0812
	Wearing duty belt on duty			
Duty belt equipment	81.7 (n = 224)	31.5 (n = 195)	108.6792	<0.0001
Uniform shoes or footwear	50.2 (n = 25)	17.2 (n = 198)	50.7362	<0.0001
	Frequently lifting or carrying heavy objects			
Work related lifting or carrying	74.6 (n = 103)	23.6 (n = 314)	87.9876	<0.0001
	Frequently twisting trunk or legs			
Twisting movements at work	61.3 (n = 297)	30.6 (n = 124)	32.9047	<0.0001

for prolonged periods is well studied and not unique to police work. The literature indicates that back pain should be more common among workers for whom driving is an important part of their work.^{1,5-10,22,23,28,30,32,39} There also have been several studies indicating that back pain is more common among police officers who drive as a frequent part of their duties.^{11,30} Accordingly, it was expected that the prevalence would be significantly higher in police officers than in the general population. Because this was not the case, it was supposed that the failure to demonstrate an increased prevalence of back pain was a result of the admixture of a significant portion of police officers who did not drive for more than half the day. Analysis of the survey results indicated that only about half of the respondents spent more than half their day driving or sitting in a vehicle. It was expected that these people would have a higher rate of back problems, but this expectation was not realized. The rate of back pain among those who drove or spent more than half their day in vehicles was the same as in those who did not.

The authors can only speculate about the possible reasons for this finding; however, others have suggested that the ergonomic attributes of the driver compartment and the seating may be a factor-in particular, the tendency to use smaller vehicles in European police forces.³⁰ Other studies linking driving to an increased risk for back pain have examined heavier vehicles such as tractors and buses.^{1,6} This police force uses full-size vehicles of North

American manufacture with fully adjustable seats and often with adjustable steering columns. The cushioning of the usual "police package" is also in general more firm than that in usual passenger vehicles.

Another factor may be the level of fitness achieved by members of this force. This study suggests that most RCMP members are actively engaged in pursuits designed to promote and maintain fitness. Although there is conflicting evidence concerning the importance of weight, there may be some relationship between obesity and low back trouble,²⁹ and there is evidence to suggest a higher level of fitness may be beneficial for back health.^{12,17,19,26}

The perception among police officers that the duty belt plays a significant role in the development of back pain is not supported by this study.

It is important to acknowledge that although these data do not support the conclusion that these factors represent an increased risk for low back pain in this particular population, these work-related factors might be a problem for people in the population, and a police officer with back problems may experience an exacerbation of these problems as a result of one of these duty-related factors.

It is important to address the perceived causes of low back pain among police officers as well as the proven contributors, for two important reasons: because the perceived causes might be actual exacerbators, and because perceived contributors determine the police offi-

cer's assignment of cause and the steps taken to alleviate the problem. Indeed, in a 1995 survey of health promotion needs in this organization, 5 1% of RCMP members surveyed regarded low back pain as a major or moderate health concern, and 70% regarded "back care" as of major or moderate personal importance as an area for health promotion activity.

■ Conclusion

The current study was designed to determine prevalence of low back pain among RCMP members and to assess the validity of the perception that the patrol car seat and the duty belt are causing a higher rate of low back pain among members of the RCMP than in the general population. The study demonstrates that the prevalence of low back pain among police officers is not different from that in the general population. The study confirmed that police officers in this population who had back pain perceived the seat of the patrol car and the duty belt as contributors to their back pain. This study did not demonstrate an increased risk of low back pain among police officers who drive or sit in vehicles for more than half their working day compared with police officers who do not. The study did not demonstrate an increased prevalence of low back pain among police officers who wore a duty belt compared with police officers who did not wear the duty belt.

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