
ARTICLES

Symptom Characteristics
in Women with Chronic WAD, Grades I-II,
and Chronic Insidious Onset Neck Pain:
A Cross-Sectional Study
with an 18-Month Follow-Up

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ABSTRACT. Introduction. A questionnaire-based, cross-sectional study with an 18-month follow-up telephone interview was designed to determine whether symptom characteristics differ in women presenting with chronic (> 6 months) neck pain related to whiplash associated disorder (WAD),

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grades I-II (n = 41) and chronic insidious onset neck pain (IONP) (n = 39).

Methods. The women were recruited from informed doctors and physical therapists. The duration of symptoms was > 6 months and < 48 months in both groups. The main outcome is given as frequency distribution of duration and nature of neck pain and related disorders.

Results. Neck pain, shoulder pain, self-reported activity-related complaints and specific complaints, like numbness in the arms, memory loss and poor concentration, were significantly more prevalent and severe in the WAD-group as compared to the IONP-group ($p = 0.01, 0.001$ and 0.01 , respectively). The telephone interview 18 months later showed that 97.3% of the respondents in the WAD-group and 47.2% of the respondents in the IONP-group were still symptomatic.

Conclusion. The results indicate that the women in the chronic WAD-group had more severe symptoms than the women in the chronic IONP-group. Once in a chronic phase, the symptoms of women with WAD are more persistent and severe. [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <docdelivery@haworthpress.com> Website: <<http://www.HaworthPress.com>> © 2004 by The Haworth Press, Inc. All rights reserved.]

KEYWORDS. Whiplash injuries, neck pain, women, symptom, disability, questionnaire

INTRODUCTION

Chronic neck pain and related disorders after motor vehicle crashes (MVCs) are one of the most controversial epidemiological issues in medicine today. The estimated figures for those who develop chronic symptoms (> 6 months) vary greatly between studies, from 1.9% (1) to 43% (2). More than 80% of whiplash claimants are classified as grades I-II, as defined by the Quebec Task Force on WAD (1, 3). Patients with grade I and II complain of neck pain, stiffness or tenderness only, either without physical sign(s) (Grade I) or with musculoskeletal sign(s) including decreased range of motion and point tenderness (Grade II). Patients with more serious pathological conditions, exhibiting objective neurological sign(s) are classified as Grade III and those with fracture or dislocation are classified as Grade IV. Symptoms and disorders that can be manifested in all grades include deafness, dizziness, tinnitus, headache, memory loss, dysphagia and temporomandibular joint pain (1).

To date, patients with WAD grades I-II have been diagnosed on the basis of subjective symptoms and on the exclusion of visible trauma on standard imaging modalities (4). Similar symptoms are also frequent in members of the general population who have not been exposed to MVCs (5,6). It has been proposed that no difference exists between the prevalence of chronic symptoms in patients with WAD and symptomatic subjects in the general population (5,7).

Primary health care providers often find it difficult to help patients with chronic WAD which is consistent with research that indicates that once in a chronic phase (> 6 months), their symptoms tend to persist (2,8,9). Patients with chronic insidious onset neck pain (IONP) are good representatives for those people who commonly seek treatment from primary health care. It is not known whether symptom characteristics of patients with chronic neck pain of WAD, grades I-II, differ from those with IONP.

Doubt has been cast upon the validity of chronic WAD symptoms (10). In fact, the plethora of symptoms and the difficulty of demonstrating distinct injury in patients with chronic WAD, grades I-II, have polarized opinion about their symptoms (10,11). One view is that psychological and social factors are the main sources for chronic complaints as a consequence of MVCs (12,13). The other view is that, despite not being visible on x-rays, CT-scans or MRI, chronic physical damage from the initial trauma explains the chronic symptoms (4).

Women are more prone than men to develop musculoskeletal symptoms in the head-neck-shoulder girdle area after minor MVCs (14). One possible explanation is that women have anatomically weaker necks (15). Common explanations for insidious onset pain in women in general include more workload on the shoulder-neck area and less control over the working environment (16) in repetitive monotonous work tasks (17).

Despite conflicting views regarding the validity of chronic WAD (10,11), no effort has been made to distinguish between complaints in patients with chronic WAD and chronic IONP. In this study, symptom characteristics in the head, neck, shoulder girdle and arms in these two seemingly similar chronic neck pain groups were analysed by means of questionnaires and an interview. The core questions in this study focused on activity-related complaints in order to compare work-related ability in these two groups. Specific questions were asked to explore the extent and nature of the complaints. In addition, the women were followed-up by a telephone interview 18 months after they answered the questionnaires to determine whether or not symptoms persisted.

The aims of this study were to determine whether symptom characteristics in women diagnosed with chronic WAD, grades I-II, differ from those in women diagnosed with chronic IONP and whether the persistence of symptoms differs between the two groups.

METHODS

Subjects

The cases were women with chronic WAD, grades I-II ($n = 41$), and women with chronic IONP ($n = 39$) matched according to age. Table 1a shows the subjects' demographic data. Doctors and physiotherapists working in all 13 primary health care centres in Reykjavík and surroundings in Iceland, an area with 180,000 inhabitants, were asked to recruit the women. The doctors and physiotherapists performed a physical screening examination of all the women to explore whether they fulfilled the inclusion-exclusion criteria in Table 1b. The living and educational standard is similar among inhabitants in this area. Women who accessed primary health care services in a fixed seven-month period and fulfilled the inclusion and exclusion criteria in Table 1b were asked to participate on a voluntarily basis. Five to eight women were recruited from each centre. All women were registered and randomly allocated for appointments for examination (18) to avoid a systematic error in a radiographic examination of the cervical spine (19,20). Five women of the initially selected groups refused to participate but all the other women gave their informed consent. Two women in the WAD-group were excluded as they had been exposed to two MVCs and one woman in the IONP-group did not attend her appointment. Ethical clearance was obtained from the Medical Ethics Committee at Landspítalinn, University Hospital in Reykjavík as well as from the Icelandic Radiation Protection Institute.

Questionnaires

The standardised Nordic questionnaires for the analysis of musculoskeletal symptoms, which have been validated for people living in the Nordic countries (21,22) were used in a modified form (Table 2). The Nordic questionnaires have been used in Iceland to evaluate musculoskeletal symptoms in different employment groups (23-25). This study utilized the neck and the shoulder sections of the Nordic questionnaires. One question in this section inquires specifically about injury-re-

TABLE 1a. Comparison of demographic characteristics

	WAD-Group	IONP-Group
Mean age in years (SD)	29.3 (8.5)	31.6 (8.7)
Mean height in cm (SD)*	169.0 (4.7)	168.3 (5.8)
Median weight in kg (quartiles)**	62.0 (55.8-72.3)	66.0 (61.0-77.0)
Median working hours/week (quartiles)**	38.5 (0-40.5)	35.0 (7.0-44.0)
Median pain duration in months (quartiles)**	14 (7.2-25.2)	13 (6.8-28.5)
Median months elapsed since the MVCs (quartiles)	14 (8.5-24.5)	

No significant differences by *the Independent t-test or **the Mann Whitney U test.

TABLE 1b. Inclusion and exclusion criteria

	Inclusion	Exclusion
General	<ol style="list-style-type: none"> Age: 16-48 Employed or student Driving a car on a regular basis 	<ol style="list-style-type: none"> Systematic diseases of any kind Personality changes Pregnancy
	<i>Prior to the crash:</i>	<ol style="list-style-type: none"> > 1 crash/accident before the examination
	<ol style="list-style-type: none"> Healthy (no symptoms from the upper part of the body) 	<ol style="list-style-type: none"> Prone to get musculoskeletal symptoms prior to the MVC
	<i>After the crash:</i>	<ol style="list-style-type: none"> Road accident of another kind than in a car
WAD	<ol style="list-style-type: none"> WAD grades I-II, as outlined in the QTF on WAD Attends the primary health care for help because of symptoms for > 6 months and < 48 months 	<ol style="list-style-type: none"> Car crash in rural setting Signs of radiculopathy in the arm(s) by physical examination
IONP	<ol style="list-style-type: none"> Musculoskeletal symptoms from the upper part of the body including the neck Attends the primary health care for help because of symptoms for > 6 months and < 48 months 	<ol style="list-style-type: none"> MVC or another type of injury Signs of radiculopathy in the arm(s) by physical examination

lated neck and shoulder troubles. This question was therefore used to double check whether the inclusion-exclusion criteria in Table 1b were valid. The general part of the Nordic questionnaires was omitted, as were the more detailed questions for the lower back. Instead, four specially constructed yes-no questions for symptoms in the head and

TABLE 2. Questions about neck and shoulder troubles according to the Nordic questionnaires

a. Have you ever had to change jobs or duties because of neck or shoulder trouble?

	WAD	IONP	OR (95% CI)	p
	Yes/No	Yes/No		
Neck	9/31	4/35	2.5 (0.7-9.1)	0.14
Shoulder	6/29	2/32	3.3 (0.6-17.7)	0.14

b. What is the total length of time you have had trouble during the last 12 months?

Neck¹	WAD	IONP	Trend in %	Chi-square	p
0 days	0	1		14.638	0.0001
1-7 days	2	2	12.5%		
8-30 days	0	11			
>30 days	16	16	50.0%		
Daily	23	9	71.8%		
Shoulder¹	WAD	IONP	Trend in %	Chi-square	p
0 days	4	5		12.965	0.0003
1-7 days	1	6	29.6%		
8-30 days	3	8			
>30 days	17	17	50.0%		
Daily	16	3	84.2%		

c. Have you reduced your activity in the last 12 months because of neck or shoulder trouble?

1. *At work*

	WAD	IONP	OR (95% CI)	p
	Yes/No	Yes/No		
Neck	35/5	27/11	2.8 (0.9-9.2)	0.07
Shoulder	32/5	19/15	5.1 (1.6-16.1)	0.004

2. *At leisure*

	WAD	IONP	OR (95% CI)	p
	Yes/No	Yes/No		
Neck	36/4	22/15	6.1 (1.8-20.9)	0.002
Shoulder	32/4	15/18	9.6 (2.8-33.3)	0.0001

d. What is the total length of time this trouble has prevented you from doing your work (at home or away from home) during the last 12 months?

Neck ¹	WAD	IONP	Trend in %	Chi-square	p
0 days	5	13	27.7%	14.493	0.0001
1-7 days	10	18	35.7%		
8-30 days	9	3	75.0%		
>30 days	12	4	80.0%		
Daily	4	0			
Shoulder ¹	WAD	IONP	Trend in %	Chi-square	p
0 days	7	15	31.8%	10.850	0.001
1-7 days	7	11	38.8%		
8-30 days	10	4	71.4%		
>30 days	12	3	80.0%		
Daily	0	0			

e. Have you had trouble at any time during the last 7 days?

	WAD Yes/No	IONP Yes/No	OR (95% CI)	p
Neck	40/1	31/7	9.0 (1.1-77.3)	0.02
Shoulder	35/2	24/10	7.3 (1.5-36.3)	0.007

¹The boxes show how cells were combined.

arms were included (Table 3). The questions regarding the head addressed symptoms in the ears, eyes, and face as well as about migraine-type headache. The questions regarding the arms addressed feelings of cold, numbness, loss of strength and “clumsiness.” For all eight of the specific symptoms, the question asked was worded as follows: “Have you ever in the last 12 months had the following symptoms lasting altogether for about a month or longer?” Finally, nine direct questions were added about complaints associated with post-concussion syndrome according to Lidvall et al. 1974 (26).

The questionnaires were presented to the women on arrival at the Department of Radiography. The women answered them in a quiet setting prior to radiographic examination. A person not otherwise involved in the study assisted the women in filling out the questionnaires when necessary.

TABLE 3. Prevalence and 95% confidence intervals of specific complaints over the last 12 months

Complaint	The WAD-group			The IONP-group			p
	%	(95% CI)	No. ^a	%	(95% CI)	No. ^a	
A. The Head							
Ears ^b	37.8	(22.5-55.2)	14/37	29.7	(15.9-46.9)	11/37	0.57
Eyes ^c	43.6	(27.8-60.4)	17/39	50.0	(32.9-67.1)	18/36	0.74
Face ^d	22.8	(10.4-40.1)	8/35	15.8	(6.0-31.2)	6/38	0.64
Headache ^e	28.9	(15.4-45.9)	11/38	42.8	(26.3-60.6)	15/35	0.32
B. The Arms							
Coldness	40.0	(23.8-57.9)	14/35	21.4	(8.3-40.9)	6/28	0.19
Numbness	73.5	(55.6-87.1)	25/34	37.0	(19.4-57.6)	10/27	0.01 ^f
Weakness	37.1	(21.5-55.1)	13/35	40.7	(22.4-61.2)	11/27	0.98
Clumsiness	40.0	(21.1-61.3)	10/25	33.3	(16.5-54.0)	9/27	0.96
C. The Post-Concussion Syndrome							
Depression	36.6	(22.1-53.0)	15/41	17.9	(7.53-33.5)	7/39	0.11
Dizziness	39.0	(24.2-55.5)	16/41	35.9	(21.2-52.8)	14/39	0.95
Fatigue	36.6	(22.1-53.1)	15/41	43.6	(27.8-60.4)	17/39	0.68
Lability	51.2	(35.1-67.1)	21/41	30.8	(17.0-47.6)	12/39	0.10
Anxiety	31.7	(18.1-48.1)	13/41	23.1	(11.1-39.3)	9/39	0.54
Insomnia	51.2	(35.1-67.1)	21/41	33.3	(19.1-50.2)	13/39	0.16
Restlessness	31.7	(18.1-48.1)	13/41	23.1	(11.1-39.3)	9/39	0.54
Memory loss	43.9	(28.5-60.2)	18/41	7.7	(1.6-20.9)	3/39	0.0006 ^f
Poor concentration	56.1	(39.7-71.5)	23/41	25.6	(13.0-42.1)	10/39	0.01 ^f

^aDifferent numbers in the denominator are due to number of responders on each question.

^bPain, tinnitus, hearing loss.

^cPain, blurred vision, diplopia, fixation-tracking problem.

^dPain, dysesthesia, numbness.

^eMigraine-type.

^fStatistically significant.

Telephone Interview at 18-Month Follow-Up

A telephone interview was administered 18 months after the subjects had answered the baseline questionnaires. In order to determine the status of former complaints, a junior high school teacher interviewed all eligible participants. Six forced questions and one half-open and one open question were asked. The forced questions were as follows:

1. "Do you have symptoms now?" ("No" meant that the respondents had finished their participation.)

2. "Are you better, the same or worse than a year ago?"
3. "What makes your symptoms become worse?" Choose one of the following statements:
 - a. I get worse with physical demands
 - b. I get worse with mental demands
 - c. I get worse with both physical and mental demands
 - d. I cannot relate the worsening in symptoms to anything special
4. "Does working in a sitting position affect your symptoms?"
5. "Do you use medications?"
6. "Do you get any form of physical treatment?"

The half-open questions were as follows: "Do the symptoms affect you in any way and if yes, how?" The answers to this question were interpreted and classified as no, moderate and severe. Inability to work partly or fully or to perform other duties as before distinguished moderate from severe. The open question was: "Can you describe the feeling when you become worse in a sitting position?" In addition, the WAD-group answered the question: "Is the insurance compensation claim finalized?" The questions inquired about complaints during the last 12 months only, because it was thought to be difficult to recall specific complaints of longer duration.

Statistics

The demographic data were analysed by the t-test or the Mann-Whitney *U* test. The main outcome measures of the questionnaires and the telephone interviews were frequency, duration and nature of neck pain and related disorders. The answers to the questionnaires were compared using the Chi-square test. The Chi-square test for linear trend was used to test for trend in proportions across categories. Odds ratios (ORs) with 95% confidence intervals and p-values were also calculated. For specific complaints, the prevalence and the 95% confidence intervals were calculated for each group. The statistically significant level for all tests was set at $p < 0.05$. The telephone interviews were only analysed descriptively.

RESULTS

Table 1a shows that the demographic variables were not significantly different. All women answered the questionnaires. Table 2 summarises

the results of the Nordic questionnaires. The WAD-group had significantly greater reduction in activity due to neck or shoulder problems than the IONP-group. Numbness, loss of memory and poor concentration were also reported significantly more often by the WAD-group than the IONP-group (Table 3B-C). Other specific complaints in Table 3 were not significantly different between the groups. The response rate to telephone questionnaire 18 months later was 90.3% (37 of 41) in the WAD-group and 92.3% (36 of 39) in the IONP-group. Table 4 shows the results for the subjects who were still symptomatic after 18 months indicating more persisting problems in the WAD-group.

TABLE 4. Characteristics of symptomatic subjects at the follow-up telephone interview

		WAD-Group (n = 37)	IONP-Group (n = 36)
Symptomatic		36 (97.3%)	17 (47.2%)
	Better	8 (22.2%)	7 (41.2%)
	Same	13 (36.1%)	5 (29.4%)
	Worse	15 (41.7%)	5 (29.4%)
What makes your symptoms become worse?			
	Physical demands	9 (25.0%)	3 (17.6%)
	Mental demands	0 (0.0%)	0 (0.0%)
	Both physical/mental demands	17 (47.3%)	11 (64.8%)
	Nothing special	10 (27.7%)	3 (17.6%)
Does working in a sitting position affect your symptoms?			
	Yes	30 (83.3%)	11 (64.7%)
	No	6 (16.7%)	6 (35.3%)
Do you use medications?			
	Yes	17 (47.2%)	6 (35.3%)
	No	19 (52.8%)	11 (64.7%)
Do you get any form of physical treatment?			
	Yes	2 (61.1%)	9 (53.0%)
	No	14 (38.9%)	8 (47.0%)
Do the symptoms affect your live?			
	No	4 (11.1%)	4 (23.5%)
	Moderately	14 (38.9%)	11 (64.7%)
	Severely	18 (50.0%)	2 (11.8%)
Is the insurance compensation claim finalised?			
	Yes	22 (61.1%)	
	No	14 (38.9%)	

DISCUSSION

There is a general agreement about the validity of acute symptoms after MVCs, but the existence and validity of chronic symptoms are vigorously debated (27,28). This study was designed to answer the question of whether neck pain and related symptoms in women with WAD and IONP, measured by the standardised Nordic questionnaires and specially constructed questions, differed in the chronic setting (Table 1b). Although neck pain and related disorders are frequent and disabling complaints in the general population (5,6), this study indicates that women with chronic WAD are significantly more severely affected by their symptoms than women with chronic IONP. One underlying mechanism might be the greater compromise in the segmental stability of the cervical spine observed in the women with WAD compared to the women with IONP. This was made clear by two radiographic studies in which the same women participated (19,20). The first radiographic study demonstrated that in comparison to the IONP group and an asymptomatic control group, the WAD group exhibited a different configuration of the cervical lordosis. The C4-C5 level was also significantly more kyphotic in the WAD-group when compared to the asymptomatic control group (19). The second radiographic study revealed that more women in the WAD-group had increased segmental motion in the mid cervical segments than in the IONP-group, which point to an injury (20).

In the Nordic questionnaires differences between the WAD group and the IONP group were revealed in many cases (Table 2). It contained questions about activity-related complaints which are perhaps a better indicator of chronicity than direct questions about various symptoms (6). The special questions in Table 3 include subjective symptoms often related to neck disorders. The fact that the women with chronic WAD complained much more often about memory loss and concentration problems than the women with IONP also reflects the difference between the two groups (Table 3C). The debate about whether or not these specific complaints are due to minor head injury is ongoing. These symptoms may be a consequence of the initial neck injury (29) but other factors may influence the poor outcome of chronic WAD patients on cognitive tests (30,31).

At the 18-month follow-up, all but one of the respondents in the WAD-group (36 of 37 or 97.3%) were still symptomatic compared to 17 of 36 respondents (47.2%) in the IONP-group. This poor recovery rate of patients with chronic WAD is consistent with several other studies (8,9,32-35). As the recovery rate of patients with WAD is disputed,

it is particularly interesting to compare a study conducted by Brison et al. (8) with a study conducted by Suissa et al. (36). Both studies were conducted in Canada in provinces with a no-fault insurance system which makes it difficult to receive compensation for pain and disability. In the study by Brison et al., 30% of 385 patients with WAD, grades I-II, from an emergency department population, were found to still be symptomatic at the 3-month follow-up, a prevalence rate which remained fairly steady over the rest of the 2-year follow-up period. In the study by Suissa et al., which included 2627 subjects based on retrospective medical chart reviews from the insurance companies of compensated injuries, only 12% of WAD patients were found to be still symptomatic at 6-months post accident. The latter study excluded all subjects with complaints from other body regions other than the neck suggesting that only mild cases were included. The study by Suissa et al. also used cessation of time-loss compensation as an indicator for recovery.

At the 18-month follow-up, 61.1% of the women with WAD had finalized their compensation claims (Table 4) suggesting that economic gain is less likely to influence the outcome in this study. The women in this study had been receiving treatment by doctors in primary health care, physical therapists and chiropractors and their persistent symptoms suggest that the treatment had not been very effective, particularly for the WAD-group (Table 4). The poor success rate of treatment continues to warrant scrutiny and suggests that a more effective approach is needed. Most importantly, efforts must be made following MVCs to find ways to prevent persistent and disabling symptoms and their consequences.

This study was conducted on patients who were already suffering from chronic pain and did not seek to establish any firm causal relationship between the MVCs and the symptoms present at the time of the study. It is not possible to know whether the differences observed between the groups were present from the onset of symptoms or whether the differences developed over time. A recall bias may have influenced the results of this study, as the women in the chronic whiplash group may not have recalled prior painful episodes of neck pain. It is more likely that the women with chronic IONP recalled a past history of neck injury as they were suffering from chronic neck symptoms. The participants in this study represent the younger age groups of the population as it is in these groups that the frequency of WAD is highest (1). It is often difficult to diagnose these young women because objective neurological or radiological signs are often lacking. Results of a recent longitudinal study of a large cohort (7,669 individuals) in South Manchester,

United Kingdom with no pain at baseline (37) support the observed differences between the two groups in this study. It was found that prior neck injury is a distinct and separate risk factor for long-term episodic neck pain, independent of recall bias and not explained by psychosocial influences on the development of chronic pain (37). Other recent studies have also found an increased risk of chronic neck pain problems in people who have been exposed to MVCs, and who had reported acute injury (38,39).

CONCLUSION

This study indicates that the chronic WAD-group, grades I-II, is more affected by symptoms and has more chronic complaints than the chronic IONP-group. Neck pain, shoulder pain, self-reported activity-related complaints and specific complaints like numbness in the arms, memory loss and poor concentration were significantly more prevalent and severe in the WAD-group. The telephone interview 18-months later shows that once in a chronic phase, the symptoms of the WAD-group tend to persist.

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