



Tennis elbow: associated psychological factors

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Background: The etiology of tennis elbow is multifactorial. Overuse of the wrist extensors along with anatomic factors, such as flexibility problems, aging, and poor blood circulation, may play a role. This study investigated whether patients with tennis elbow have a different psychological profile compared with healthy controls.

Methods: Patients with clinical signs of tennis elbow, consulting at the Ghent University Hospital between September 2015 and January 2017, were offered a paper-and-pencil questionnaire about Big Five personality traits, perfectionism, anxiety, depression, work satisfaction, and working conditions. Healthy controls in the same risk group were offered the same questionnaires.

Results: We recruited 69 patients (35 men, 34 women) and 100 controls (44 men, 56 women). Tennis elbow patients scored significantly lower on the personality traits extraversion and agreeableness. Men, in particular, scored significantly higher on perfectionism and were more likely to develop an anxiety disorder or a depression. Concerning work, patients indicated a significantly higher workload (especially men) and a significantly lower autonomy (especially women). Female patients also indicated less contact with colleagues. However, work satisfaction was relatively high in both groups.

Conclusion: The results suggest that there is a relationship between complaints related to tennis elbow and psychological characteristics.

Level of evidence: Level III; Case-Control Design; Prognosis Study

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Tennis elbow is a painful condition of the extensor tendons in the dorsal forearm, which attach at the lateral epicondyle

of the humerus. The extensor carpi radialis brevis muscle is the affected tendon in almost 90% of cases.^{2,9} It is a frequent cause of elbow pain, with an annual incidence of 10 to 30 cases per 1000 adults and a peak incidence between the ages of 35 and 55 years. In most cases, the diagnosis of lateral epicondylitis can be made clinically. However, further investigations may be required when the diagnosis is less clear.^{1,4,10,18} Because the condition is common at an age when individuals are professionally active, it has become an

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important cause of (mostly prolonged) absenteeism. Therefore, tennis elbow has a big economic impact.^{13,15}

Multiple factors may play a role in the etiology of tennis elbow. These factors include overuse of the wrist extensors, typically caused by repetitive movements of the forearm or by heavy lifting. Some anatomic factors, such as flexibility problems, aging, and poor blood circulation, could favor the development of the injury.^{6,9,17,19}

The condition is mostly self-limiting within the year, but several conservative therapies are available, including physiotherapy, bracing, oral medication, or injections. If conservative treatment is unsuccessful after 6 to 12 months, surgery can be proposed.^{10,11,14} Despite all of the therapeutic options, there is still no standardized protocol for treating tennis elbow and there is still insufficient evidence of the efficacy for each of the proposed conservative treatments.

Whether conservative treatments offer any long-term benefit compared with watchful waiting remains unclear. Most of these treatments are therefore simply observational and based on a wait-and-see management. Although the results in the literature seem to be good, the indications for surgery are not well described, and evidence is lacking to prefer a specific surgical technique. Up to 20% continue to experience significant complaints postoperatively despite several treatment attempts, which cannot be ignored.^{10-12,14,18}

The lack of evidence of an effective treatment for tennis elbow suggests that there is need for more research in the etiology of tennis elbow and the factors that are negatively associated with the therapeutic success. The aim of the study was to find out whether psychological factors play a role in the etiology of tennis elbow and whether patients who come for treatment to the hospital have a specific psychological profile.

Materials and methods

Study design

The study design was a prospective case-control study.

Study sample

Patients

The study sample consisted of patients with clinical signs of tennis elbow consulting at the Ghent University Hospital between September 2015 and January 2017. The diagnosis of tennis elbow was made on clinical grounds: pain at the lateral epicondyle or just distally of it for at least 6 weeks and a painful resisted dorsiflexion of the wrist (more painful with the elbow in extension than with the elbow in flexion). Exclusion criteria were pain at the mobile wad (brachioradialis muscle, extensor carpi radialis brevis muscle, and extensor carpi radialis longus muscle), loss of passive range of motion, crepitus during pronation and supination at the soft spot, and pain at the wrist, neck, or shoulder. Included were 69 patients (34 men and 35 women) with tennis elbow, with a mean age of 47 years (range, 26-64 years).

Table I Distribution of professions

Profession	Patients		Controls	
	%	No.	%	No.
Construction worker	33.3	23	28	28
Cleaning helper	18.8	13	19	19
Office work	11.6	8	11	11
Warehouse/stockroom worker	10.1	7	24	24
Factory worker	10.1	7	—	—
Nurse	7.2	5	18	18
Mechanic	4.3	3	—	—
Retired	4.3	3	—	—
Total	100	69	100	100

Table II Employment in the last 6 months

Employment	Patients		Controls	
	%	No.	%	No.
Full-time	50.7	35	79	79
Part-time	30.4	21	21	21
Not working	18.8	13	—	—

Controls

The control group consisted of people with no tennis elbow but who belonged to the same risk group (same age category and same professions). The age range and the professions of the patient population were used to recruit the control group participants (Tables I and II). Questionnaires were distributed in warehouses, stockrooms, factories, construction yards, cleaning companies, and health care facilities, such as hospitals and retirement homes, to reach the control persons. The inclusion criterion was an age between 30 and 65 years and the exclusion criteria were having a tennis elbow at the moment of interrogation or a history of tennis elbow. In total, 100 healthy controls (44 men and 56 women), with a mean age of 45 years (range, 30-62), were recruited.

Instruments

A paper-and-pencil questionnaire was administered to determine the psychological profile of tennis elbow patients.

The Big Five personality traits (openness, conscientiousness, extraversion, agreeableness, and emotional stability) were assessed with the Dutch version of the Ten-Item Personality Inventory, with 2 items for each personality trait.⁸ The items were answered on a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Perfectionism was investigated by means of the Dutch version of the Frost Multidimensional Perfectionism Scale, consisting of 10 items, 6 items for positive perfectionism (eg, "I try to be an organized person") and 4 items for negative perfectionism (eg, "If I don't set the bar high for myself, chances are that I end up as a second class person").⁷ The items were answered on a 6-point scale ranging from 1 (strongly disagree) to 6 (strongly agree).

Anxiety and depression were assessed by the Dutch version of the Hospital Anxiety and Depression Scale,³ which contains 14 items, 7 items for anxiety and 7 for depression, each rated from 0 to 3.

Questions about work satisfaction and working conditions were asked, which only needed to be answered if the patient had been

working in the last 6 months. Patients were asked to indicate their work satisfaction on a scale from 0 to 10, followed by 3 items about workload (e.g. "I enjoy working"), 3 items about the effect of work on their private life (eg, "When I come home from work, I'm too tired to do the necessary household chores"), and 3 items about the effect of the private life on work (eg, "I arrive too tired at work to perform well because of the household chores I've done").⁵ These items were answered on a 5-point scale ranging from 1 (never) to 5 (always).

Last, 18 items about work content were presented, including 6 items about autonomy at work (eg, "I can decide for myself how fast or how slow I work"), 4 items about contact and collaboration with colleagues (eg, "While working, it's possible to ask colleagues for help"), 4 items about work variation (eg, "My work consists for the biggest part of routine work"), 1 item about short-cycle work ("My work consists mainly of short, self-repeating actions"), and 3 items about provision of information (eg, "I am enough aware of what is expected of me"). These items were developed by the Stichting Innovatie & Arbeid in the context of the Synergy project¹⁶ and were answered on a 6-point scale ranging from 1 (strongly disagree) to 6 (strongly agree).

Statistics

All data were analyzed using IBM SPSS Statistics 23 software (IBM, Armonk, NY, USA). The Shapiro-Wilk test and an additional Q-Q plot checked normality of the data. Data were compared between patients and controls, between male patients and male controls, and

between female patients and female controls with the independent samples *t* test or the Mann-Whitney *U* test, depending on the normality of the data. A *P* value of $\leq .05$ was considered significant.

Results

Table III reports the mean scores of the total patient population on the different aspects of the questionnaire compared with the mean scores of the healthy controls. Table IV reports the mean scores of the male and the female patients separately, compared with, respectively, the healthy male and the healthy female controls.

Sociodemographic differences

There were no significant differences in age between the tennis elbow patients and the controls ($P = .17$).

Personality: Ten-Item Personality Inventory

In the total study population, a significant difference was found for the traits agreeableness ($P = .036$) and extraversion ($P = .049$), with tennis elbow patients scoring significantly lower on both domains than healthy controls. With regard to the other 3 personality traits, no significant differences were found.

Table III Comparison between patients and controls

Variable	Patients			Controls			<i>P</i> *
	No.	Mean	SD	No.	Mean	SD	
Personality							
Extraversion	68	4.68	1.39	99	4.95	1.36	.049
Agreeableness	68	5.41	1.22	99	5.75	0.99	.036
Conscientiousness	69	5.64	1.13	100	5.44	1.13	.166
Neuroticism	68	4.93	1.31	100	5.06	1.41	.165
Openness	68	5.16	1.31	100	5.36	1.16	.130
Perfectionism							
Perfectionism	68	45.85	7.08	100	43.34	7.97	.064
Positive	69	29.83	4.46	100	28.33	5.26	.051
Negative	68	15.74	3.75	100	15.01	3.72	.218
Anxiety and depression							
Anxiety	67	5.83	3.10	100	5.40	3.53	.047
Depression	67	4.17	2.79	100	3.67	3.14	.024
Working conditions							
Work satisfaction	54	7.56	1.56	100	7.82	1.13	.559
Workload	55	48.06	15.31	99	43.26	10.56	.030
Impact of work on private life	56	53.61	18.90	100	54.18	18.11	.753
Impact of private life on work	56	37.08	14.29	99	34.47	13.36	.063
Autonomy	56	50.94	19.84	98	56.38	14.80	.055
Contact and cooperation	55	66.93	17.43	99	70.97	15.05	.292
Variation	54	66.23	12.49	99	63.74	14.94	.079
Repetitive work	54	65.63	29.46	100	52.48	25.63	.031
Information provision	55	82.99	12.10	100	79.20	14.27	.232

SD, standard deviation.

* Bold values indicate statistical significance ($P \leq .05$).

Table IV Comparison between male patients and controls and female patients and controls

Variable	Patients						Controls						<i>P</i> *	
	No.		Mean		SD		No.		Mean		SD			
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Personality														
Extraversion	33	35	4.83	4.54	1.53	1.25	43	56	5.01	5.01	1.48	1.48	.144	.229
Agreeableness	34	34	5.17	5.62	1.28	1.14	44	55	5.78	5.78	1.11	1.11	.079	.212
Conscientiousness	34	35	5.37	5.88	1.25	0.98	44	56	5.22	5.22	1.30	1.30	.234	.326
Neuroticism	34	34	5.43	4.46	1.14	1.31	44	56	5.15	5.15	1.58	1.58	.714	.060
Openness	34	34	5.35	4.98	1.22	1.40	44	56	5.42	5.42	1.29	1.29	.330	.191
Perfectionism														
Perfectionism	34	34	45.91	46.26	6.71	7.18	44	56	40.61	45.58	8.66	6.72	.021	.603
Positive	34	35	29.53	29.84	4.98	4.57	44	56	26.20	30.00	5.92	3.99	.010	.551
Negative	34	34	15.80	15.76	3.46	4.08	44	56	14.41	15.48	3.67	3.72	.117	.737
Anxiety and depression														
Anxiety	34	33	4.35	7.48	2.81	3.32	44	56	4.23	6.32	3.40	3.37	.091	.117
Depression	34	33	4.04	4.28	2.64	2.98	44	56	3.64	3.70	2.83	3.38	.153	.072
Working conditions														
Work satisfaction	25	29	8.04	7.12	1.54	1.47	44	56	8.13	7.67	1.24	0.98	.878	.419
Workload	27	28	46.67	49.33	16.70	14.14	44	55	40.30	44.57	12.20	9.23	.040	.205
Impact private life on work	27	29	35.94	55.47	14.60	15.48	44	56	32.88	53.09	14.97	15.32	.253	.352
Impact work on private life	27	29	53.09	38.13	21.68	14.21	44	55	55.76	35.06	21.62	11.74	.615	.115
Autonomy	27	29	59.90	45.31	17.72	19.73	43	55	55.16	57.42	16.08	13.93	.546	.002
Contact and cooperation	27	28	74.46	60.00	13.37	18.08	44	55	68.55	71.67	16.21	14.75	.305	.012
Variation	27	27	64.67	67.67	13.17	11.92	43	56	62.70	64.55	15.29	14.56	.105	.446
Repetitive work	26	28	61.59	69.33	27.26	31.43	44	56	51.19	53.94	27.40	23.78	.209	.050
Information provision	27	28	82.61	83.33	11.64	12.73	44	56	79.63	79.29	16.03	12.72	.701	.009

SD, standard deviation; ♂, male; ♀, female.

* Bold values indicate statistical significance ($P \leq .05$).

Perfectionism: Frost Multidimensional Perfectionism Scale

A borderline significant difference was found in the total study population for the subdomain positive perfectionism, with patients scoring higher than controls ($P = .051$). For the total scale perfectionism and the subdomain negative perfectionism, no significant differences were found in the study sample. Analyses conducted for men and women separately revealed no significant differences between female patients and female controls. However, male patients scored significantly higher on perfectionism ($P = .021$) and the subdomain positive perfectionism ($P = .01$) compared with healthy male controls.

Anxiety and depression: Hospital Anxiety and Depression Scale

Tennis elbow patients scored significantly higher on anxiety ($P = .047$) and depression ($P = .024$) than healthy controls. The separate analyses by gender revealed no significant differences.

Working conditions

Tennis elbow patients had significant higher scores on workload ($P = .03$) and repetitive work ($P = .031$) than healthy controls. No other significant between-group differences were found.

The analyses by gender revealed several differences between men and women. Male elbow patients reported significant higher levels of workload than male controls ($P = .04$). Female elbow patients experienced lower levels of autonomy ($P = .002$) and contact and cooperation ($P = .012$) than female controls and reported more repetitive work ($P = .05$) and information provision ($P = .009$) compared with female controls.

Discussion

To our knowledge, the present study is the first to simultaneously examine personality traits, anxiety, depressive feelings, and working conditions in tennis elbow patients to find out which psychological factors play a role in the etiology of tennis elbow.

The analyses revealed a significant difference between tennis elbow patients and controls for the dimension agreeableness. Tennis elbow patients scored significantly lower on this dimension than controls. Such characteristics could complicate the treatment of tennis elbow. As shown in other studies, a good relationship between the doctor or therapist and the patient is essential to bring the therapy to a successful conclusion. If there is lack of trust in the doctor-patient relationship, the patient might question the success of the prescribed therapy, with bad compliance as a consequence.^{12,14}

Furthermore, a borderline significant between-group difference was found on the dimension extraversion. Tennis elbow patients seem to be less extraverted and enthusiastic compared with healthy controls.

Our findings further demonstrate that male elbow patients (and not female patients) were more perfectionists compared with healthy controls. Perfectionists always strive for the best. This can be positive when, in the end, there is satisfaction with what has been accomplished and the self-esteem is strengthened. This becomes negative when the striving continues and never reaches satisfaction, and consequently, the self-esteem becomes weakened. This study found a particularly significant difference for the subdomain of positive perfectionism and not for negative perfectionism. While striving for excellence, perfectionists in general, even positive perfectionists, would resume the former work activities much sooner, leaving little time to let the injury heal, with possibly a worsening of the injury as a consequence.

A significant between-group difference was found through the Hospital Anxiety and Depression Scale for anxiety and depression. The findings revealed that tennis elbow patients have higher anxiety and depression levels than controls. This implicates that practitioners who are confronted with elbow patients should adapt their language while explaining the condition and treatment so that patients do not become more anxious.

Work satisfaction was not significantly different between patients and controls. With a mean value of respectively 7.56 and 7.82 on a scale from 0 to 10, the conclusion can be made that both groups are generally satisfied at the workplace. This contrasts with the 2016 study of Thiese et al,¹⁷ who concluded that tennis elbow seemed to be associated with a low work satisfaction.

For the other working conditions, our analyses revealed several differences between male and female elbow patients. A significant difference was found in workload between patients and controls, especially among men. Male tennis elbow patients indicated a significantly higher level of workload. Thiese et al¹⁷ found similar results, concluding that mentally demanding work increases the risk of tennis elbow because of an imbalance between workload and carrying capacity of the individual. A significant difference was also found for repetitive work, especially among women, with tennis elbow being associated with a higher level of repetitive work. Indeed, numerous previous studies have shown that short, repetitive movements and routine work cause tennis elbow.

Female tennis elbow patients also indicated a significantly lower level of autonomy at the workplace than controls. This is in line with the study of Thiese et al,¹⁷ which found an association of tennis elbow with poor occupational control. Last, female patients also indicated significantly less contact with colleagues at the workplace than controls. Thiese et al¹⁷ also found an association between the condition and poor social support at the workplace. These gender differences implicate that men and women do different kinds of work and that possible interventions at the workplace should be adjusted to these differences.

This study has some shortcomings. First, self-reported questionnaires were used, thus increasing the probability of social desirability. Second, the diagnosis of tennis elbow is made clinically without technical examination, but this conforms with the literature.¹⁰ Third, the cross-sectional nature of the data makes causality difficult to establish, and it remains unclear whether the personality traits and psychological factors contribute to the origin of tennis elbow or that these are consequences of the condition. Tennis elbow is a long-lasting, painful condition, so it is not unthinkable that it can lead to psychological complaints. Corroboration of our findings produced by longitudinal data would lend credibility to the findings. More research in the direction of the association is recommended.

Conclusions

The main conclusion is that tennis elbow patients are less agreeable and have more depressive feelings and that male tennis elbow patients (but not female patients) are more positive perfectionists compared with healthy controls. Furthermore, differences between tennis elbow patients and controls on working conditions are gendered to some extent.

Although the results are not strong enough to define a specific tennis elbow personality, some recommendations can be made. Doctors and therapists should be aware of these possible psychological characteristics and should try to recognize these patients, who easily become anxious and have difficulties in trusting other people. With these patients, we propose that doctors should take more time during the consultation to adapt their explanations about the condition, to not increase anxiety or depressive feelings, and to strengthen the doctor-patient relationship, whatever the proposed treatment will be. Also, possible preventions at the workplace, such as awareness raising campaigns, should be tailored to men and women.

Disclaimer

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