

SCREENING EVALUATION AND PREDICTING PROGNOSIS OF CRANIOMANDIBULAR DISORDER PATIENTS WITH THE SOLBERG QUESTIONNAIRE

Mi-Hi Park, D.D.S., Myung-Yun Ko, D.D.S., M.S.D., Ph.D.

Department of Oral Medicine, College of Dentistry, Pusan National University

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I. INTRODUCTION

Craniomandibular disorders(CMD)¹⁾ or temporomandibular disorders(TMD)^{2,3)} is a collective term embracing a number of clinical problems that involve the masticatory musculature, the temporomandibular joint and associated structures, or both⁴⁾. CMD have been in the orofacial region and are considered to be a subclassification of musculoskeletal disorders⁵⁾.

Common complaints of CMD patients include jawache, earache, headache, and facial pain. In addition to pain, patients with these disorders frequently have limited or asymmetric jaw movement, joint sounds, and nonpainful masticatory muscle hypertrophy and abnormal

occlusal wear associated with oral parafunction such as bruxism⁶⁾. The signs and symptoms of CMD may be transient and self-limiting, resolving without serious long-term effects^{8,9)}. For this reason, a special effort should be made to avoid aggressive, nonreversible therapy⁶⁾. Conservative treatments are endorsed for the initial care of nearly all CMD⁶⁾. However, contributing factors are behavioral, psychosocial, and physical factors that may predispose to, initiate, or perpetuate craniomandibular disorders and thus may complicate management^{6,7)}.

Screening for CMD is recommended as an essential²⁾. Screening process is to detect, as early as possible, the signs and symptoms associated with the various forms of CMD¹⁰⁾. The screening consists of a questionnaire, brief history, and examination⁶⁾. If the patient's subjective complaints or objective findings are significant, the screening examination can be precursor to a more comprehensive history and examination^{11 14)}.

The type of screening questionnaires is various^{2,4,6,10,15-22)}. Among domestic studies with questionnaire were those of Chung and Im¹⁹⁾, Kim and Lee²⁰⁾, and Chung et al²¹⁾; among abroad

ones were Agerberg and Carlsson^{15,23}, Carlsson et al²⁴, Agrberg and Inkapool²⁵, and Schiffman et al²⁶. However, most of those studies were about clinical signs and symptoms of CMD patients, not about contributing factors and behavioral responses. In addition, there were some difficulties in predicting response to treatment with those questionnaires. The author studied wit the Solberg questionnaire which is divided in 4 parts:jaw function, habits and otehr factors, behavioral responses, and worsening prognosis²².

The purpose of this study is (1) to investigate characteristics of CMD patients according to sex, age, duration of symptoms, diagnosis, psychological status, and responses to treatment ;(2) to determine the validity of the Solberg's opinion regarding each part of his questionnaire ;(3) to evaluate the ability of prediction to treatment outcome with Solber questionnaire.

II. MATERIALS AND METHODS

1. Subjects

The subjects in the study were 884 CMD outpatients, who visited the Department of Oral medicine, Pusan National University Howpital during the period from 1990 to 1993. They had visited at least two times and received conservative treatment.

Th age range of the patients was 13 to 80 years. The mean age was 31.3 years and the mean treatment period was 1.9 months. The age and sex distribution of the subjects is given in Table 1.

2. Methods

The author gave a self-administered Solberg

Table 1. Age and sex distribution of the subjects

Sex	Age groups(years)					Total
	≤19	20-29	30-39	40-49	≥50	
Female	102	231	153	60	94	640
Mele	46	116	36	26	20	244
Total	148	347	189	86	114	884

questionnaire (Fig. 1)²⁷ to the new outpatients. This questionnaire is in a "yes" or "no" format and is composed of 4 parts. Part 1 has 9 items associated with jaw function. Part 2 has 6 items about habits and other factors. Part 3 has 5 items about behavioral responses in the face of symptoms. Part 4 has 6 items associated with a worsening prognosis²².

After the patients filled out the questionnaire, examiners performed routine clinical examination of the stomatognathic system, took panoramic and transcranial views, and gave clinical laboratory tests. Furthermore, corrected tomography was taken for patients suspected of having degenerative joint disease. Examiners also recorded the findings on the TMJ chart and the patients filled out the SCL-90-R28). Progress notes were recorded with Numerical Analogue Scale (NAS)^{29,30} by the patients themselves on each visit.

Based upon TMJ chart, SCL-90-R, and progress note, the subjects were divided according to age, sex, duration of symptoms, diagnosis, psychological status, and response to treatment. The author summed up the number of questions with a positive response on each part of questionnaire. Then the mean numbers of positively answered items were compared. To evaluate the diffenences between groups, t-test and F-test were performed.

악관절환자를 위한 조사설문서

다음은 환자여러분들을 보다 효과적으로 진찰하고 치료해 드리기 위하여 작성된 설문지입니다. 잘 생각하셔서 “예” 또는 “아니오” 에 표시하십시오.

예 아니오													1	부
1	-	-	입을 벌리고 다물 때 턱에서 소리가 나며 그것이 당신이나 다른 사람을 불편하게 합니까?											
2	-	-	턱이 잘 움직이지 않아서 자우롭게 입을 벌리지 못합니까?											
3	-	-	입을 크게 벌리거나 씹을 때 통증이 있습니까?											
4	-	-	귀나 귀 앞부위에 통증이 있습니까?											
5	-	-	얼굴, 뺨, 턱, 목구멍 또는 관자놀이에 통증이 있습니까?											
6	-	-	원하는 만큼 입을 벌리지 못하십니까?											
7	-	-	자주 두통으로 고생합니까?											
8	-	-	식사를 많이 하고난 후나 치과치료후 당신은 턱이 피곤하다고 느끼니까?											
9	-	-	아래 윗니가 불편하게 물린다고 느끼니까?											
예 아니오													2	부
1	-	-	밤중에 이를 가는 것을 느낀 적이 있습니까?											
2	-	-	아래 윗니를 꽉 물고 있는 버릇이 있습니까?											
3	-	-	아침에 일어날 때 불편하거나 두통이 있습니까?											
4	-	-	항상 한쪽으로만 음식을 씹으십니까?											
5	-	-	턱에 외상이나 충격을 받는 적이 있습니까?											
6	-	-	습관적으로 껌을 씹거나 파이프 담배를 피우십니까?											
예 아니오													3	부
1	-	-	통증이나 불쾌감으로 잠을 설치십니까?											
2	-	-	통증이나 불쾌감으로 일상생활이나 다른 행동에 제약을 받으십니까?											
3	-	-	통증이나 불쾌감으로 약물치료를 받거나 약을 드십니까?(진통제, 근육이완제, 한우물제 등)											
4	-	-	통증이나 불쾌감으로 식욕의 변화를 느끼니까?											
5	-	-	통증이나 불쾌감이 좌절감이나 우울감을 느끼게 할 때가 있습니까?											
예 아니오													4	부
1	-	-	다른 관절의 염증이나 통증으로 고통을 받으십니까?											
2	-	-	신경성 위장장애나 궤양으로 고통을 받으십니까?											
3	-	-	변비나 장염으로 고통을 받으십니까?											
4	-	-	등이나 목의 통증으로 고통을 받으십니까?											
5	-	-	피부병이나 알레르기 증상으로 고통을 받으십니까?											
6	-	-	턱의 근육이나 턱관절의 이상으로 해서 치료받는 경험이 있습니까?											

Fig. 1. Questionnaire for temporomandibular disorders^{22,27)}

III. RESULTS

1. Prevalence of positively answered items to the questionnaire

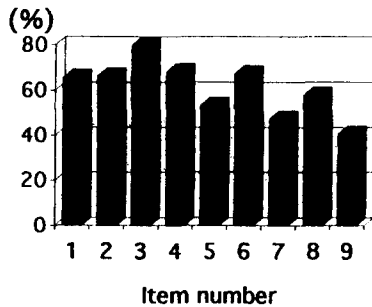
The frequency of positive responses to the questionnaire is shown in Figure 2. Data from Part 1 revealed that the highest percent of patients responded affirmatively to the question, dose it hurt when you chew or open wide to take a big bite? (81.3%) In Part 2, the most frequent answer was unilateral chewing (59.1%). Part 3 revealed that the highest percent of positive response was the item of frustrating/ depressing (41.1%). In part 4, the most frequent answer was back/neck pain (40.3%). Very significant differences were shown in each part of questionnaire using

χ^2 -test ($p < 0.01$).

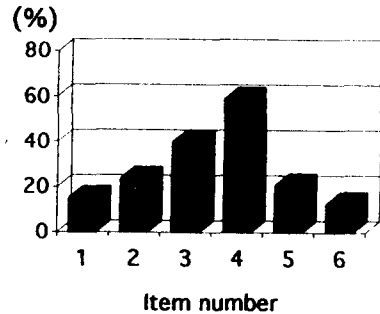
2. Sex and Age

Wen compared to the mean numbers of positively answered items of male and female, female reported significantly higher numbers than male in Parts 1 and 4 ($p < 0.01$), however male did so in Part 2 ($p < 0.05$) (Table 2).

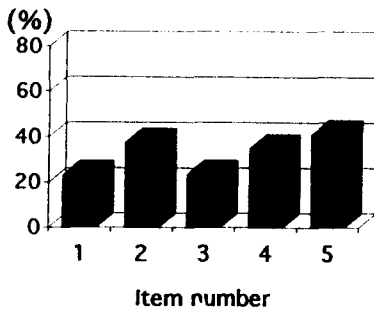
All the subjects were classified into 5 groups by age: under 19, 20-29, 30-39, 40-49, and above 50^{29,31,33}. Very significant differences were revealed in Parts 3 and 4 ($p < 0.01$). As a rule, the older the subjects became, the larger the number of positive answers got in Parts 3 and 4 (Table 3).



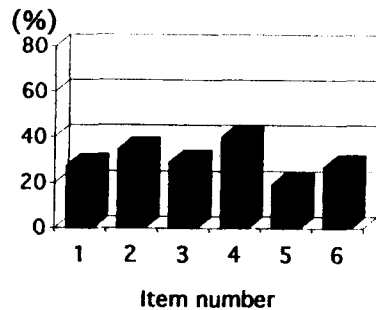
Part 1. jaw function



Part 2. Habits



Part 3. Behavioral response



Part 4. Worsening prognosis

Fig. 2. Percentage distribution of positively answered 884 subjects

Table 2. Mean and standard deviation of the numbers of answered items according to sex

Sex	N	Part 1	Part 2	Part 3	Part 4
Fernale	640	5.63±2.02	1.68±1.07	1.63±1.50	1.92±1.40
Mele	244	5.09±2.13	1.83±1.20	1.53±1.50	1.43±1.32
t-value		3.54**	-1.87*	0.88	4.78**

* p<0.05, ** p<0.01

Table 3. Mean and standard deviation of the numbers of positively answered items according to age

Age	N	Part 1	Part 2	Part 3	Part 4
≤19	148	5.12±1.94	1.60±1.14	0.97±1.23	1.47±1.29
20-29	347	5.50±2.09	1.75±1.15	1.43±1.42	1.59±1.35
30-39	189	5.63±2.17	1.75±1.10	1.96±1.56	1.89±1.43
40-49	86	5.45±1.88	1.86±1.08	1.87±1.52	2.19±1.37
≥50	114	5.67±2.04	1.61±1.00	2.17±1.59	2.31±1.43
F-value		1.66	1.23	15.98**	10.08**

** p<0.01

Table 4. Mean and standard deviation of the numbers of positively answered items according to the duration of symptoms

Duration	N	Part 1	Part 2	Part 3	Part 4
Acute	406	5.25±1.88	1.63±1.10	1.57±1.50	1.65±1.35
Chronic	476	5.68±2.19	1.79±1.12	1.63±1.51	1.90±1.42
t-value		3.15**	2.16*	0.65	2.67**

* p<0.05, ** p<0.01

Table 5. Mean and standard deviation of the numbers of positively answered items according to diagnosis

Diagnosis	N	Part 1	Part 2	Part 3	Part 4
Arthralgia	303	5.01±2.16	1.54±1.04	1.35±1.40	1.48±1.36
Myalgia	161	5.08±2.00	1.78±1.09	1.81±1.55	1.87±1.46
Combined	419	5.97±1.91	1.82±1.15	1.70±1.53	1.98±1.36
F-value		24.21**	6.03**	6.72**	11.97**

** p<0.01

3. Duration of symptoms

All the subjects were classified into acute group (less than 6 months) and chronic group (more than 6 months) according to the duration

of symptoms before they visited hospita⁽⁴⁾. The result was that chronic group reported a greater number of positive answers than acute one in Parts 1 and 4 (p<0.01), and Part 2 (p<0.05) (Table 4).

Table 6. Mean and standard deviation of the numbers of positively answered items according to SCR-90-R

SCR-90-R	N	Part 1	Part 2	Part 3	Part 4
Abnormal	30	5.97±2.27	2.63±1.17	2.93±1.60	2.80±1.24
Normal	198	5.72±1.90	1.60±1.07	1.75±1.53	1.73±1.30
t-value		0.64	4.41**	3.93**	4.25**

** p<0.01

Table 7. Mean and standard deviation of the numbers of positively answered items according to treatment outcome

Tx. outcome	N	Part 1	Part 2	Part 3	Part 4
Success	252	5.46±1.96	1.72±1.04	1.50±1.44	1.62±1.32
Unsuccess	76	6.04±1.81	1.72±1.26	1.87±1.53	2.13±1.33
t-value		2.31*	0.02	0.65	2.95**

* p<0.05, ** p<0.01

4. Diagnosis

Based upon the history and examination data, patients were grouped into 3 categories for this study. Comparing arthralgia group, myalgia group, and combined group^{6,34,37}, there were high significances in all parts (p<0.01). Combined group resported a greater number of positive answers in Part 1. Combined and myalgia groups did so than arthralgia group in Parts 2, 3, and 4(Table 5).

5. SCL-90-R

The patients were catgoried into normal and abnormal groups. The patients who had got above T-scores 65 in SCL-90-R were rgarded as deviated from nomral psychologic status³⁸. These patients were classified into abnormal ones. Very significant differences were revealed(p<0.01). Therefore abnomral group showed a greater number of positive answers than normal one in Parts 2, 3, and 4(Table 6).

6. Treatment outcome

Unsuccessful patients were defined as individuals who unresponded to several months of conservative therapy³⁹ and successful patients were determined by the absence or mild discomfort of chief complaint following the conservative treatment³⁰. Unsuccessful patients significantly reported more positive responses in Parts 1 and 3(p<0.05) and in Part 4(p<.001) (Tabel 7).

IV. DISCUSSION

Cranio-mandibular disorders involve many different diseases, and the diagnoses are mainly of a musculoskeletal character, although the signs and symptoms of these diseases have many features in common⁴⁰. The aim of a patient history and clinical examination is to establish a proper diagnosis, which will then decide the treatment⁴⁰. An obtaining history should accomplish the following:(1) to identify

the problem and to delve explicitly into the regional or associated symptoms;(2) to evaluate for habits, trauma, and other general factors which point to the etiology of the complaints;(3) to develop the psychosocial context(illness, suffering) accompanying the disease or disorder;(4) to identify and assess the outcome of prior treatment²²⁾. Therefore the Solberg questionnaire was considered important in predicting the patient characteristics, especially treatment outcome through Parts 1, 2, 3, and which have questions of TMD symptom, contributing factors, behavioral and general conditions.

Question that can be raised with respect to this study is the believability of self-reported data. Although these data are not as reliable as clinical examination, there is evidence from previous research that the correlation between a clinical examination and patient self-assessment in CMD is reliable⁴⁾. In addition, judging from the results of epidemiological and patient self-assessment in CMD is reliable⁴¹⁾. In addition, judging from the results of epidemiological and recent clinical studies, the self-administered questionnaire obviously has some benefits⁴²⁾. It has been found to be more reliable than the clinical interview and other methods, as it eliminates the expectations and prejudiced views of the examiner⁴²⁾. The written questionnaire is also a guarantee that important data will not be left out⁴²⁾.

As there had already been reported about discriminative power of CMD questionnaires⁴³⁾, this study was performed on only CMD patients for seeking treatment. The sexual distribution was F:M=2.6:1, that of TMD patients for seeking treatment was no difference in other studies^{44,45)}. In explaining the dominance of mandibular dysfunction in women, the concept that women are more health conscious and seek medical and dental attention more readily

than men^{15,46,47)} could be suggested.

Some authors also suggested that women have a high degree of psychosomatic disease^{15,48-50)}, that women are less tolerant to pain⁵¹⁻⁵³⁾, and that women consider life events more stressful than men⁵⁴⁾. Observing age, the highest percent of patients were found in third and fourth decades group and 13-39 year patients were 77% of total subjects. Therefore, it is consistent that Solberg stated the target group for therapy appear to be women between the ages of 15 and 40 years²²⁾.

Part 1 of the Solberg questionnaire includes questions that identify the probable TMD and most of these are associated with jaw function²²⁾. Whereas this study reveals that the highest percent of positive answers was the item of chewing/wide opening pain, other studies revealed that the items of noise^{15,16,19,20,26,55)}, difficulty in opening²¹⁾, headache^{24,56)}, pain in face, eye, throat, or neck²⁵⁾, and noise/headache⁴²⁾ were the most frequent answers. These differences probably resulted from a variety of understanding questions, the way to questions are asked, and questions which are included. In addition, most of other studies subjected to nonpatient group. In part 2, the most frequently answered item was unilateral chewing. In Kim and Lee's research²⁰⁾, higher TMD index was found in unilateral chewing population than in bilateral chewing one. Part 3 is similar to "effect due to symptom" questions in Agerberg and Inkapool's study²⁵⁾ which was on urban Swedish population. The most frequent answer of that study was use of painkiller but in this study was frustrating/depressing. The author supposed that the questions of Part 4 consisted of somatic factors of patients. Part 4 revealed that the highest percent of positive answers was back/neck pain and this result had the likeness to Berry's study⁵⁸⁾ which 55% of CMD patients' past medical history was back, neck,

and shoulder pain. Also, according to Agerberg and Helkimo, the high prevalence of symptoms from the neck and shoulders indicated that many patients were polysymptomatic⁴²⁾.

As compared with male, female reported more symptoms in Part 1. This result is consistent with studies of Reider et al¹⁶⁾, Agrberg and Inkapool²⁵⁾, and Kleinknecht et al⁵⁶⁾ that women always indicated a higher percent of mandibular dysfunction. In Part 2, male showed higher positive answers because there were more grinding/bruxing habit^{15,16)}, more opportunity to trauma, and much pipe smokers. In Part 4, higher positive answers in female suggested that women have a high degree of psychosomatic diseases^{15,48-50)}.

A significant difference according to age was not seen in Part 1. It indicated that TMD symptoms had a weak and inconsistent relationship to age in previous studies^{30,56)}. Otherwise, age differences were noted in Parts 3 and 4. Kim and Lee²⁰⁾ reported that 65-74 year old people complained the worst condition of subjective physical state in any other age group and they had higher percent of whole body joint pain, muscle pain, and headache. Koidis et al⁵⁷⁾ found that per TM joint problems³⁴⁾. But the author modified this classification criteria that myalgia patients had neither joint sounds or a history of occasional sounds⁶¹⁾. Statistically significant differences were seen in all parts. Combined group had the highest positive answers in Part 1. Combined myalgia group had higher positive responses than arthralgia group in Parts 2, 3, and 4. In studies of Shiffman et al²⁶⁾ and Part and Ko³⁰⁾ reported that combined group showed the highest symptom index. Also, in the combined group there were high correlations between pain and depression scores³⁴⁾. Park and Ko³⁰⁾ already insisted that combined and myalgia group reveal poor prognosis. The results that myalgia group was

more positive responses are consistent with those by Eversole et al⁶²⁾ and Dworkin et al⁶³⁾ who reported more distress in patients with MPD versus those with ID.

There were various studies^{34,39,56,60,64-67)} about psychological aspects of CMD patients. A number of these studies used a variety of evaluation devices including psychological inventories in an attempt to characterize the CMD patients. The SCL-90-R is a 90-item self-report inventory designed to assess psychological symptom patterns⁶⁸⁾. It has shown good reliability and has also been used extensively in medical settings as a screening tool to an outcome measure⁶⁸⁾. Abnormal patient SCL-90-R showed more positive answers in Parts 2, 3, and 4 than normal ones. A significant difference in Part 2 was similar to Kim and Lee's study²⁰⁾: as the stress index increased, the frequency of parafunction was higher. The fact that abnormal patients showed higher positive responses in Parts 3 and 4 meant they had poor prognosis. This result was similar to that of Schwartz et al³⁹⁾, using MMPI. Speculand et al⁶⁴⁾ also identified a group of patients who responded poorly to conservative treatment by psychological questionnaire. On the contrary, study of Gerke and Goss⁶⁰⁾ showed that pre-treatment psychological distress was not predictive of outcome. Therefore, it is still controversial whether psychologically abnormal patients regularly respond worse than psychologically normal patients.

CMD management programs include patient education and self-care, cognitive intervention, psychotherapy, pharmacotherapy, physical therapy, orthopedic appliance therapy, occlusal therapy, and surgery⁴⁾. Generally, conservative treatments are behavioral modification, physical therapy, and orthopedic appliance therapy⁴⁾. Successful treatment was determined by the absence (NAS, 0) or significant reduction (NAS, 1)

of chief complaint following the administration of one or more conservative treatment modalities³⁰⁾. Unsuccessful patients were individuals who had failed to respond to several months of similar therapy³⁹⁾. Unsuccessful patients significantly reported more positive responses in Parts 1, 3, and 4. This result is much the same as Solberg's opinion²²⁾ that patients who respond positively to all parts have poor prognosis. The author assumed that the fact of higher positive answers in unsuccessful group had relation to complexity of CMD.

This study was conducted as an initial investigation of the Solberg questionnaire. The result showed female, older, chronic, combined and myalgic, high scores in SCL-90-R, and unsuccessful patients had more positive responses to questionnaire. Solberg²²⁾ stated that patients answering positively in Parts 1 and 2 only were more likely to respond to treatment than those patients who responded to all parts of the questionnaire. Especially, Parts 3 and 4 dealt with general factors associated with worsening prognosis. This study provides positive results and the author consents to Solberg's opinion about his questionnaire.

However this result must be reviewed with caution. First, subjects in this study had small sample size in some experimental groups, particularly in SCL-90-R and in treatment outcome. Second, it is yet controversial that individual differences in psychological status prior to conservative treatment identify patients who respond poorly to treatment resulting in clinically useful predictions⁶⁰⁾. Then further research is necessary to use various psychological testing measures instead of single one and to assess the nature of psychological factors. Third, decision of treatment outcome is difficult. As with any chronic pain disorder, it is reasonable to assume that there will be remission in intensity of the initial symptoms

but not a complete cure⁷⁰⁾. Satisfaction with treatment and perceived change in symptoms should be rated. When recording the responses to questionnaire, it would be better using the intensity rating format than "yes" or "no" format. Besides, criteria for successful treatment must be provided objectively. Therefore using a multitude of index systems and recording the objective finding about response to treatment will give us more accurate results.

The usefulness of the self-administered questionnaire for collecting general information is fully accepted. The Solberg questionnaire revealed the efficacy of screening the CMD patients and of detecting the suspicious patients who are likely to respond poorly prior to treatment. Preparing and meticulous planning the treatment with a simple and timesaving questionnaire is valuable to therapists who look toward the complexity of CMD.

V. CONCLUSIONS

The author studied on 884 patients who were diagnosed as craniomandibular disorders and conservatively treated at Department of Oral Medicine, Pusan National University Hospital from 1990 through 1993.

According to sex, age, the duration of symptoms, diagnosis, psychological status, and response to treatment, they were classified and analyzed with the Solberg questionnaire in respect to the pattern of responses and predicting prognosis.

The obtained results were as follows.

1. While female patients responded positively more often to the questions of jaw function and worsening prognosis, male patients did so to the questions of habits and other factors.
2. Older patient responded positively more often

to the questions of behavioral response and worsening prognosis.

3. Chronic group showed higher number of positive answers to all the questions than acute one.
4. Combined and myalgia groups revealed higher positive responses to all the questions than arthralgia one.
5. Abnormal group in SCL-90-R revealed more positive responses to all the questions except jaw function than normal group.
6. Unsuccessful group responded positively more often to all the items except habits than successful one.

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Solberg 설문지를 이용한 두개하악장애환자의 간이평가 및 예후예측

부산대학교 치과대학 구강내과학 교실

박 미 희 · 고 명 연

저자는 1990년부터 1993년 사이에 부산대학병원 구강내과에 내원하여 두개하악장애로 진단되어 보존적 치료를 시행받은 884명의 환자를 대상으로 Solberg의 악관절장애조사 설문지를 작성케한 후, 성, 연령, 병력기간, 진단명, SCL-90-R, 치료에 대한 반응에 따라 환자군을 세분하여 각 환자군의 설문지 문항별 응답양태 및 이에 따른 예후예측을 분석한 바 다음과 같은 결론을 얻었다.

1. 악기능 및 예후악화요인 문항에서는 여성이 높은 응답수를 보인 반면, 기여요인 및 습관문항에서는 남성이 높은 응답수를 나타내었다.
2. 고령층의 환자에서 행동 및 예후악화요인이 두드러졌다.
3. 만성군이 급성군에 비해 전 문항에서 높은 응답수를 나타내었다.
4. 혼합군 및 근육장애환자가 관절장애환자에 비해 설문지 전 문항에서 많은 응답을 하였다.
5. SCL-90-R에서 비정상인 환자가 정상군의 환자에 비해 악기능을 제외한 전 문항에서 높은 응답수를 보였다.
6. 치료에 무반응인 환자가 성공한 환자에 비해 습관요인 문항을 제외한 설문지 전체에서 많은 응답을 하였다.