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Does bracing affect self-image? A prospective study on 54 patients with adolescent idiopathic scoliosis

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Abstract To evaluate the effect of brace treatment on self-image in patients with adolescent idiopathic scoliosis, 54 consecutive patients admitted for brace treatment were interviewed before bracing. A prevalidated questionnaire including the following five aspects of self-image was used: (1) body-image, (2) self-perception of skills and talents, (3) emotional well-being, (4) relations with family, and (5) relations with others. As a control group, the answers of 3465 normal school children were used. Forty-six patients participated in a follow-up interview 1.7 (range 0.8–3.0) years later. In addition, during the first interview, the scoliosis patients answered selected questions about their social circumstances and attitudes towards their forthcoming brace treatment. Grossly, the patient group lived in stable family conditions with a high percentage (40%) of fathers and/or mothers with an academic education or with a high employee status. The patients' relations with families were generally good. Nearly all believed that the brace would affect their posture, but only a few thought that wearing the brace would influence their growth. Two-thirds believed that it would be difficult to wear the brace, and often reflected on the use of it. There were no statistically significant differences between the scoliosis patients and the age-matched controls at the pre-bracing nor at the follow-up interviews. Neither were there any statistically significant differences between the answers of the scoliosis patients in the pre-bracing and follow-up interviews. This was valid for the total score as well as for each subscale item score. It is concluded that wearing the brace does not affect the self-image of adolescents with idiopathic scoliosis negatively.

Key words Scoliosis · Brace treatment · Self-image

Introduction

As brace treatment of idiopathic scoliosis has proven effective and has become accepted as a realistic treatment alternative [11], the psychological impact of its use on children has become a major concern. The psychosocial effect of bracing has been discussed in many reports. The studies have focused on children's ability to cope with the stress of chronic disability [5, 10, 14, 17, 19], on the long-term effect of scoliosis treatment, either by brace or operation [1, 2, 4, 6, 12], and on identifying factors contributing to non-compliance [15, 18]. Most of these studies have included patients treated with the Milwaukee brace, and adequate age-matched control groups have not been used. Brace wear has been found to be related to a negative body-image, lower level of self-esteem, and increased stress [6, 9]. Factors such as an intellectual understanding of scoliosis and bracing, optimistic view of outcome, active decision to wear the brace, and support of family and

medical staff have been found to contribute positively to brace treatment [10]. The importance of the mother-child relationship has been stressed [8, 10]. Since the treatment coincides with a life period of emotional instability and variation as well as with bodily changes, any conclusions about treatment effects on self-image should be based on studies including age-matched controls.

The aim of this study was to evaluate the effect of brace treatment on self-image in patients with progressive adolescent idiopathic scoliosis, with a prevalidated, standardized questionnaire, and to compare it with an age-matched control group.

Patients and methods

The questionnaire used in this study (*"Jag tycker jag är"* – "I think I am" [13]) was originally constructed to evaluate self-image in children and teenagers. It is based on 72 statements about their own person, and in an interview the subjects are asked to decide how well the statements correspond to their own view of themselves. The questions are related to the following aspects of self-image, here called subscales: (1) body-image; (2) psychological properties such as capabilities and talents; (3) emotional well-being; (4) relations with family, and (5) relations with schoolmates and others. The questionnaire was tested and standardized on 3465 school children aged 7–16 years in an urban population in southern Sweden, during the years 1981–1983. Reliability was tested in a separate item analysis of how well each individual question predicted the total outcome, with calculation of inter-correlation between different subscales and the total result, by split-half investigation, and by testing its stability over time. Validity has been tested in at least four different investigations. Additionally, a factor analysis has been carried out to test the importance of each variable for the whole variance.

The study included 54 patients with idiopathic scoliosis (mean age 13.4 years with a range from 8.4 to 17.3 years): 48 girls and 6 boys. All had a verified curve progression, and were admitted to the hospital for bracing. Mean Cobb angle was 33° (24°–53°). There were 28 single primary thoracic, 16 thoracolumbar, 3 lumbar, and 7 double primary curves.

The children were admitted to the hospital for 2–5 days to learn how to wear the brace. The brace was an individually modified, prefabricated Boston type brace with an axillary support and 15° lumbar lordosis. The bracing schedule was 22 h per day. The patients were invited to participate in voluntary physiotherapy group training every 4 weeks. A regular follow-up was conducted every 3 months by a physiotherapist, and every 6 months by a doctor. The orthopaedic engineer, who was responsible for the bracing, could be reached whenever needed.

The first day of the hospital stay, the children were asked to fill in the above-mentioned questionnaire under the supervision of a physiotherapist. A follow-up interview with the same questionnaire was made after an average of 1.7 years (range 0.8–3 years), when still in the brace. Two patients had discontinued wearing the brace, four had finished brace treatment, and two could not be reached nor did they return the questionnaire when mailed. Thus, 46 patients participated in the second interview. The values for both the total and subscale item scores at the first interview of the eight missing persons did not differ from those of persons who participated in the follow-up interview.

At the same time as the first interview, the scoliosis patients were asked to fill in an additional, background questionnaire, which had been designed for this study in cooperation with a pedagogue (R-M. A.). It was filled in by 44/54; 10 children chose not to fill it in. The objective of this separate questionnaire was to document social parameters, such as parents' marital and employee status; participation in sports and training; participation in free-time activities with the family; whether the children had discussed their forthcoming brace treatment or back problems with their parents or others; their attitudes to brace treatment; and what they expected of it.

Comparisons were made between the scoliosis patients and the age-matched controls for both the pre-bracing and follow-up interviews. Comparisons were also made for the scoliosis patients between the two interviews. Additionally, the interview results of the scoliosis patients were analysed in relation to the variables in the background questionnaire. Paired two-tailed Student's *t*-test was used. Pearson's correlation coefficients were calculated between different subscales within the same interview as well as within the same subscales between interviews. If not stated otherwise, a significance level of 0.05 was chosen.

Results

Comparisons between scoliosis patients and age-matched controls before the brace treatment and at follow-up

Results from the pre-bracing and follow-up interviews as well as reference data from the age-matched control groups are presented in Tables 1 and 2.

At the first interview, the scoliosis patients scored higher than the age-matched controls in all studied subscale items; this was also true for the follow-up in all items except "emotional well-being". Within the scoliosis group there were 19 children who scored lower at follow-up than at first interview. None of these differences were, however, significant.

Thus, there were no statistically significant differences between the scoliosis patients and the age matched controls at the pre-bracing nor at the follow-up interviews. Neither were there any statistically significant differences in the answers of the scoliosis patients between the pre-bracing and follow-up interviews. This was valid for the total score as well as for each subscale item score.

If only boys were analysed, then the control group differed significantly from the study group to the better, with a higher total score and higher scores for subscales "physical properties" and "mental well-being" at both interviews. The number of boys in the study group (6/54) was, however, very small.

Scoliosis patients' background data and within-group differences

Seventy-five percent of the scoliosis patients lived with both parents. In nearly 40% of the cases, either the father or the mother had an academic education, a high employee status or were self-employed. Seventy percent of the children were engaged in sports and trained actively. About half of the patients trained more than 3–4 times per week, mostly horse riding or dancing. The numbers of those who engaged in some free-time activities with their

Table 1 Subscale item scores and total scores in the pre-bracing interview of the scoliosis patients in comparison with the age-matched controls

	Body-image	Talents, skills etc.	Emotional well-being	Relations with family	Relations with other	Total
Controls (n = 352)[a]	10.5 ± 8.3	7.1 ± 8.4	13.1 ± 9.0	16.8 ± 9.7	13.0 ± 7.7	60.5 ± 33.4
Scoliosis patients (n = 54)[b]	11.8 (12.1) ± 7.0 (7.1)	11.1 (11.2) ± 7.5 (7.6)	14.0 (13.6) ± 8.5 (8.4)	19.9 (20.2) ± 5.3 (5.3)	13.7 (13.7) ± 7.9 (8.1)	70.5 (70.6) ± 26.9 (26.9)

[a] Included here are only girls, since 48/54 children in the study group were girls. In the reference material the boys had significantly higher scores in attitudes on physical properties ($P < 0.001$) and mental well-being ($P < 0.01$)

[b] These values are for the whole material. Values for girls (n = 48) are given in parentheses

Table 2 Subscale item scores and total scores in the second interview of the scoliosis patients in comparison with age-matched controls

	Body-image	Talents, skills etc.	Emotional well-being	Relations with family	Relations with others	Total
Controls (n = 313)[a]	11.7 ± 8.7	7.8 ± 9.0	13.4 ± 9.0	17.1 ± 9.7	13.5 ± 7.2	63.9 ± 33.7
Scoliosis patients (n = 46)[b]	13.4 (13.3) ± 7.5 (7.7)	10.5 (10.3) ± 8.1 (8.3)	12.8 (12.5) ± 9.2 (9.6)	19.2 (19.4) ± 5.6 (5.6)	14.4 (14.1) ± 6.1 (6.0)	70.4 (69.5) ± 27.2 (27.6)

[a] Included here are only girls, since 42/46 children in the study group were girls. In the reference material the boys had significantly higher scores in attitudes on physical properties ($P < 0.001$) and mental well-being ($P < 0.01$) as well as for the whole outcome ($P < 0.01$)

[b] These values are for the whole material. Values for girls (n = 42) are given in parentheses

families, who had talked with their parents about their back problems as well as problems in general, or who believed that the brace would affect their posture but not their growth, were all over 80%. Nearly half of the group believed that the brace would affect their muscles, and two-thirds thought that it would be hard to wear the brace, and often reflected on its use.

Patients who scored lower than the mean value of the controls in the subscale item "relations with family" at the first interview (n = 15) had significantly lower scores ($P < 0.05$) on body image and relations with others, as well as a lower total score (51.1 vs 80.8), than those who scored higher than the mean value. The lower scoring group was characterized by low employee status of the father, low levels of participation in physical activities as well as in free-time activities with the family and they thought more often it would be difficult to wear the brace. There was a trend to higher scores on all parameters with higher employee status of the father, though this was not statistically significant.

Patients who lived in incomplete families with divorced or single parents (n = 10) increased their scores on the subscale "body image", though not statistically significantly, between the interviews (9.9 vs 12.8), whereas they lowered their scores on "emotional well-being" statistically significantly (12.4 vs 8.0; $P < 0.05$).

At the first interview, patients who often thought about, how it would be to wear the brace (n = 29) had significantly lower scores on "body-image" than those who did not reflect upon it (9.7 vs 15.1; $P < 0.05$). These patients increased their "body-image" and "relations with family" scores statistically significantly between the two interviews ($P < 0.05$).

Patients who believed that the brace would affect their growth (n = 9) increased their score in "emotional well-being" between the interviews (15.6 vs 18.0), and had a statistically significantly higher score in "emotional well-being", but lower in "relations with others" than those who believed that the brace would not affect their growth (18.0 vs 12.3; $P < 0.05$ and 7.8 vs 14.8; $P < 0.05$, respectively).

Discussion

In interpreting the study results, normal age-dependent changes and variations in family situation have to be considered. The reference material [13] shows that during the early adolescent years up to 13 years of age, there is a negative trend in all subscales, except in scores on emotional well-being and relations with others. After that, self-image is successively strengthened. The difference between sexes increases with increased age, and becomes highly significant around 15–16 years of age ($P < 0.001$). Both sexes increase their scores on relations with others at the expense of relations with their families. Teenage girls

have a more negative self-image of their own body throughout adolescence than boys, whereas the boys' views of their body-image improves significantly with age.

Some reports [2, 3, 7, 19] indicate that there may be gender-dependent differences in the reactions to bracing. The variations seen in this study mainly coincide with age-related changes seen in the control group, too.

Factor analysis of the reference material, control group, showed that at around 13–14 years of age, relations with parents and schoolmates explained over 50% of the total variance in the material. This is in accordance with previous studies, which emphasize the mother-daughter relationship in successful brace treatment [3, 8, 10], and with this study, which shows that teenagers scoring lower than average in "relations with family" showed significantly lower scores on most of the other subscale items as well, and were more anxious about their forthcoming brace treatment.

According to the national statistics [16], only 14% of employees are working at higher education levels or independently, whereas in this material, the corresponding figure is 40%. This reflects the geographic area from where our patients are recruited. This fact may have made it easier to give information on scoliosis and its treatment.

It is concluded, that bracing does not affect self-image in patients with idiopathic soliosis in a negative way.

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