

Psychosocial Functioning, Self-Perception and Body Image and Their Auxologic Correlates in Growth Hormone and Oestrogen-Treated Young Adult Women with Turner Syndrome

Katrien Lagrou^a Christelle Froidecoeur^a Francisca Verlinde^a
Margaretha Craen^b Jean De Schepper^c Inge François^d Guy Massa^{a, e}
on behalf of the Belgian Study Group of Paediatric Endocrinology

^aBelgian Study Group of Paediatric Endocrinology (BSGPE), Departments of Paediatric Endocrinology, Universities of ^bGent, ^cBrussels, ^dLeuven, and ^eVirga Jesseziekenhuis Hasselt, Belgium

Key Words

Adult · Turner syndrome · Psychosocial functioning · Body image · Oestrogen treatment · Growth hormone treatment

Abstract

Background: Few data are available on the psychosocial status of growth hormone (GH) and oestrogen treated women with Turner syndrome (TS). In this study, we evaluated psychosocial functioning, self-concept and body image in GH and oestrogen treated young adult women with TS and we studied the relationship with auxological parameters. **Patients and Methods:** Thirty women with TS (mean \pm SD age: 22.1 \pm 2.4 years), all treated with GH and oestrogens if indicated, and an age-matched reference group of 44 non-Turner female students (age: 20.5 \pm 2.1 years) completed 3 questionnaires evaluating, respectively, behavioural and emotional problems (Young Adult Self Report), self-concept (Self Perception Profile for College Students) and body-image (Body Attitude Scale). **Results:** TS patients did not report more behavioural and emotional problems compared to the non-TS females except for attention problems; they even reported fewer problems on some subscales (somatic com-

plaints, thought problems, delinquent behaviour). TS patients did not differ from the non-TS female group in their bodily satisfaction. TS patients, particularly patients with a 45,X karyotype, perceived themselves as less socially competent. BMI was significantly related to the appraisal score of the Body Attitude Scale, whereas height was not related to any of the evaluated psychosocial parameters. **Conclusion:** The psychosocial adaptation of young adult women with TS, diagnosed at an early age and treated during childhood with GH and oestrogens if indicated, appears to be quite satisfactory. Follow-up of adult TS patients should not neglect the problem of overweight and associated psychosocial consequences.

Copyright © 2006 S. Karger AG, Basel

Introduction

Turner syndrome (TS) is a genetic disorder caused by the absence or structural abnormality of one X-chromosome, affecting approximately 1/2,000 females [1]. Although it has been well-established that adults with TS are susceptible to a large range of medical and psychoso-

cial problems [2, 3], psychological studies in adult women with TS report a large variability regarding psychosocial adaptation and functioning [4–10]. Moreover, the effects of height and height gain from growth hormone (GH) treatment on psychosocial functioning still remain unclear [11–13] and the effects of oestrogen replacement therapy have only been studied on self-concept and cognitive abilities in adolescents [14–16]. Recent studies suggest that adult height or height gain during GH therapy is not associated with quality-of-life scores, whereas older age at menarche and the lack of sex hormone replacement during adult life are major determinants of psychological well-being [17, 18]. In addition, Carel et al. [17] found that the hearing status was a key predictor of health-related quality-of-life outcomes [17].

In the present study, we evaluated the psychosocial functioning, the self-concept and the body image of young adult women with TS treated during childhood with GH and oestrogens, if indicated. In addition, we studied the impact of several auxological parameters on these psychological parameters.

Patients and Methods

Patients

Young adult women with TS treated during childhood with GH by paediatric endocrinologists belonging to the Belgian Study Group for Paediatric Endocrinology were contacted in order to ask whether they were willing to participate in a psychological study. A first part of the study consisted of a mailed questionnaire concerning medical care, health and psychosocial status to be filled in at home [3]. A second part comprised a psychological evaluation taking place in the hospital where they were previously or currently followed. The study was approved by the local ethical committees of the participating centres and written informed consent was obtained from all participants.

The inclusion criteria for the present study were: age between 18 and 23 years, patients with induced puberty after completion of at least the third year of pubertal induction and patients with spontaneous puberty at least 1 year after menarche. From the 102 patients who completed the mailed questionnaire 70 (69%) reported to be willing to participate in the psychological evaluation. Forty-nine of these 70 patients fulfilled the inclusion criteria of age and puberty. At final inclusion, 30/49 patients (61%) effectively accepted to participate in the psychological evaluation: 9 patients could not be reached by phone or e-mail, 10 patients were not able or did not want to participate anymore mainly due to changes in studies, working situation or residence.

All patients were treated during childhood with biosynthetic human GH at a dose of 0.34 mg/kg/week administered as a daily subcutaneous injection. In the patients without spontaneous puberty, puberty was induced with low doses of ethinyl estradiol (EE2) (starting dose, 50 ng/kg/day) usually after at least 2 years of GH therapy alone and at a minimum age of 11 years.

Auxological and clinical data were collected from the questionnaire and completed with data from the medical record. Studied parameters were: karyotype, age and height at the start of GH treatment, duration of GH treatment, age and height at arrest of GH therapy, age at start of oestrogen therapy, age at menarche, final height and BMI. Height and BMI data were expressed as standard deviation scores using the Flemish references [19].

The test scores of the TS patient group were compared to those of an age-matched (mean age: 20.5 ± 2.1 years) reference group of 44 female students (being trained in social work or nursing).

Methods

For the psychological evaluation, 3 standardized questionnaires were used: behavioural and emotional problems were assessed by the Young Adult Self Report (YASR), self-perception by the Self Perception Profile for College Students (SPP) and body image by the Bodily Attitude Scale (BAS).

The YASR is a questionnaire for young adults aged 18–30 years developed by Achenbach [20]. The Dutch version of Verhulst [21] was adapted to the Flemish language and the Belgian school system [22]. We also developed a French version [23], both versions with copyright permission of Achenbach and with back-translation by an independent bilingual translator. The YASR contains a 119-item list of behaviours that might be problematic. Each behavioural item is rated as 0 for not true, 1 for somewhat or sometimes true, and 2 for very true or often true. Higher scores indicate more problematic scores. This profile of behavioural problems can be interpreted by grouping the problem items into externalizing (consisting of intrusive behaviour, aggressive behaviour, and delinquent behaviour); internalizing (consisting of anxious/depressed and withdrawn) and total problems and/or viewing the 'syndrome' subscales, i.e., anxious/depressed, withdrawn, somatic complaints, thought problems, attention problems, intrusive behaviour, aggressive behaviour, and delinquent behaviour. Results were expressed as T-scores by comparison with the scores obtained in a normative reference population [20]. Normalized T-scores are assigned to the raw scores of a scale according to the percentiles found for the raw scores in the normative sample. Mean ± SD T-scores for the TS group and reference group were calculated, as well as the number of subjects with scores within the clinical or pathological range (T-scores above 63 for the global behavioural scores and T-scores above 70 for the subscale scores) and within the borderline or problematic range (T-scores between 60 and 63 for the global behavioural scores and T-scores between 67 and 70 for the subscale scores).

The SPP was developed by Harter and Neemann [24] for the ages 18–23 years and has been translated, adapted and back-translated into Dutch and French with permission of the author. This questionnaire consists of 54 items subdivided into 12 subscales: scholastic competence, intellectual ability, creativity, job competence, athletic competence, physical appearance, peer acceptance, close friendship, romantic relationships, relationship with parents, morality and sense of humour. In addition, the SPP also taps global self-worth. Each of the content domains have four items per subscale, while the self-worth subscale has six items. Each item describes two statements, one reflecting high competence, the other reflecting low competence. First the subject is asked which kind of person he or she is most like; the subject then decides whether that description is rather true or really true for him or her. Each item is scored from 1 to 4, where a score of 1 indicates

low competence and a score of 4 reflects high competence. For each subscale the mean of the sum of the items is calculated.

The BAS is an originally Dutch questionnaire ('Lichaams-belevingsvragenlijst') constructed by Baardman [25] in 1989 and validated by Simis et al. [26]. Normative data are available for ages 12–22 years. We developed a French version by translating (and back-translation by an independent bilingual translator) the questionnaire from Dutch with permission of Koot. The BAS consists of 45 items and are scored on the basis of a five-point Likert scale. Appraisal, attribution and physical contact are the evaluated subscales. The appraisal factor includes items such as 'Are you satisfied with the way your body looks?' The attribution factor includes items such as 'Do you think people avoid you because of your appearance?' The physical contact factor consists of items such as 'In general, how much do you like being touched by somebody else?' Raw scores go from a minimum of 45 to a maximum of 225, higher scores indicating a more positive bodily image. For each factor the mean of the sum of the items is calculated.

Statistics

Auxological and clinical results are expressed as mean \pm SD. Test scores are expressed as T-scores (YASR) or as the mean of the sum of the items (SPP and BAS). For the YASR the number of patients with T-scores within the borderline or clinical range was also calculated. Differences in test scores between TS patients and non-TS women were evaluated by the non-paired t test, or by the Chi-Square test or Fisher's exact test as appropriate. In addition, the results obtained in TS patients with 45,X karyotype were compared with those with another karyotype by the non-paired t test. A p value < 0.05 was considered significant for inter-group comparisons. For the TS patient group potential associations between test scores and auxological parameters were analysed by regression analysis and expressed by the Pearson correlation coefficient. A p value < 0.01 was considered as significant because of multiple testing. Statistical analysis was performed using SPSS software (version 13.0, SPSS Inc., USA).

Results

Characteristics of the Subjects and Treatment

The auxological and clinical characteristics of the TS patients are shown in table 1. The age at evaluation was 22.1 ± 2.4 years. Puberty was induced in 22 patients, whereas 8 patients reported to have developed puberty spontaneously; 4 of them, however, needed oestrogen treatment to have complete pubertal development; 4 patients had spontaneous menarche. Menarche occurred at the age of 15.3 ± 1.2 years in patients with EE2 treatment, and at respectively 11, 13, 13, and 15 years in those with spontaneous menarche. Twenty-nine of the 30 women were currently taking oestrogens.

Final height was 152.6 ± 4.4 cm (range: 145–161 cm). All TS patients had a height below the population mean (166.5 cm) and 20 (67%) patients still had a height below the third percentile (155 cm). BMI was 24.1 ± 5.9 kg/

Table 1. Auxological and clinical characteristics of the Turner patients (n = 30)

	Mean \pm SD
Age at evaluation, years	22.1 \pm 2.4
Age at diagnosis, years	7.8 \pm 4.8
Age at start GH, years	10.4 \pm 2.6
Duration of GH treatment, years	6.2 \pm 2.5
Age at stop of GH treatment, years	16.6 \pm 1.2
Age at start EE2, years ^a	13.5 \pm 1.2
Age at menarche, years ^a	15.3 \pm 1.6
Age at last visit, years ^b	17.6 \pm 1.5
Height at last visit, cm ^b	152.1 \pm 5.0
Height at last visit, SDS ^b	-2.3 \pm 0.8
BMI at last visit, kg/m ² ^b	22.9 \pm 3.4
BMI at last visit, SDS ^b	0.4 \pm 1.0
Current height, cm ^c	153.0 \pm 4.5
Current height, SDS ^c	-2.3 \pm 0.8
Current BMI, kg/m ² ^c	24.1 \pm 5.8
Current BMI, SDS ^c	0.3 \pm 1.1
Karyotype	
45,X	17 (57%)
Other	13 (43%)

^a Of 26 patients who received EE2 treatment.

^b At last visit means at the end of GH treatment or at final height.

^c Current height and BMI are based upon patient's report in the mailed questionnaire.

m² (range: 17.2–46.7 kg/m²); 2 (7%) women were overweight (BMI > 25 kg/m²) and 4 (13%) were obese (BMI > 30 kg/m²). Seventeen (57%) patients had a 45,X karyotype and 13 had other karyotypes (45X,46 Xi(Xq): n = 8; 45X,46XY: n = 2; 45X,46XX,46,Xi(Xq): n = 1; 45X,46,Xi(Xq),47 Xi(Xq): n = 1; 46X,delXp: n = 1). The educational level was rather high: 16 (53%) subjects had a diploma of higher secondary education and 10 (33%) had a college or university degree, whereas only 3 (10%) patients had a diploma of lower secondary education and 1 patient received special education. No differences in clinical and auxological characteristics were observed among patients with induced or spontaneous puberty, neither among patients with the 45,X karyotype and those with other karyotypes.

Psychosocial Functioning (Behavioural and Emotional Problems)

The findings of the YASR are depicted in figure 1A, B. Both TS patients and the non-TS reference group had mean problem scores within the normal range. TS wom-

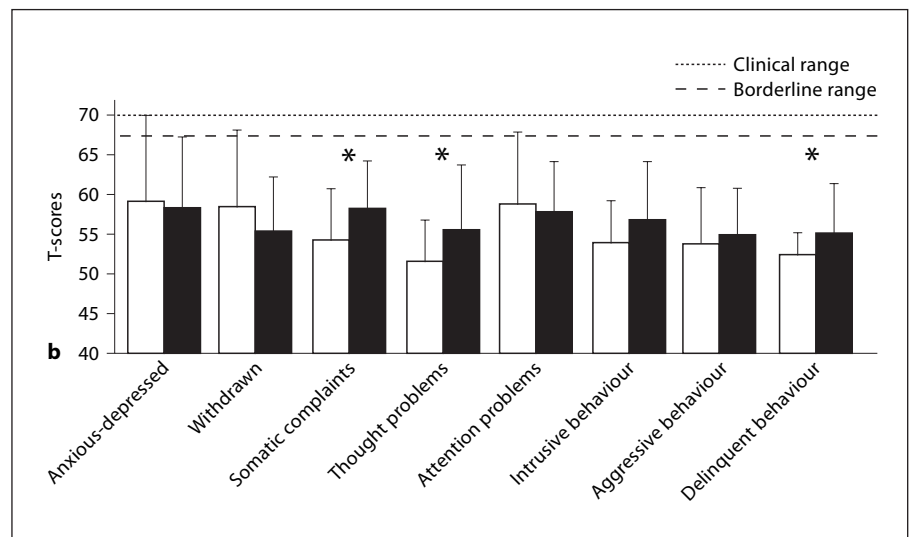
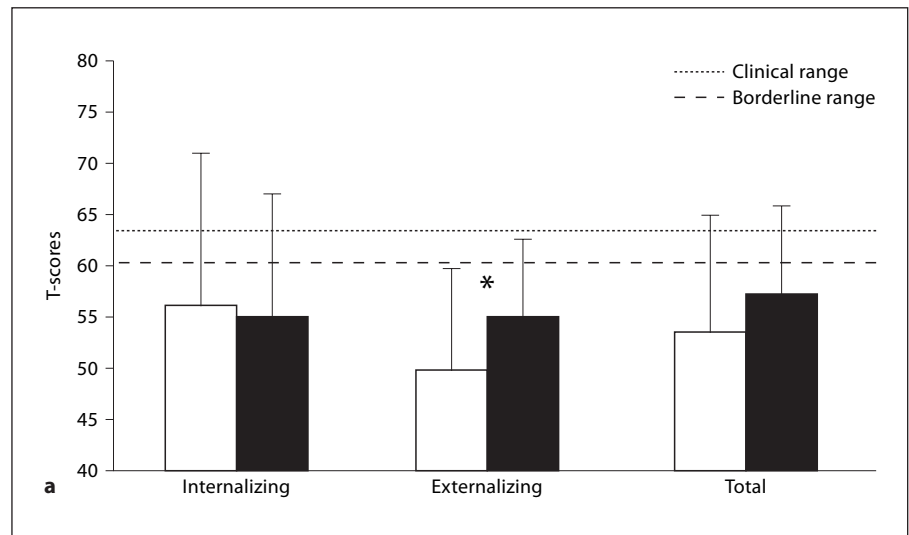


Fig. 1. a Scores at the broad-band scales of the YASR. The open bars represent the mean problem scores of the TS patients and the black bars the mean problem scores of the non-TS females. * $p < 0.05$. **b** Scores at the syndrome scales of the YASR. The open bars represent the mean problem scores of the TS patients and the black bars the mean problem scores of the non-TS females. * $p < 0.05$.

en did not have more behavioural and emotional problems compared to the non-TS females. On the contrary, TS patients had lower (less problematic) scores than the reference group on several subscales, i.e. somatic complaints (54.3 ± 6.8 vs. 57.8 ± 6.6 , $p = 0.03$), thought problems (51.6 ± 4.9 vs. 55.4 ± 8.2 , $p = 0.02$), and delinquent behaviour (52.1 ± 2.9 vs. 55.1 ± 5.8 , $p = 0.01$), as well as on the broad-band externalizing scale (49.7 ± 9.7 vs. 54.7 ± 7.8 , $p = 0.01$).

Table 2 shows that, when considering the number of subjects with deviant behavioural problems scores, i.e. YASR T-scores within the borderline or clinical range, a considerable number of TS patients, as well as of the non-TS reference group had problematic or pathological

scores on several syndrome subscales and on the 3 broad-band scales. Significantly more TS patients compared to the non-TS group had attention problem scores within the borderline range (7/30 (23%) vs. 2/44 (5%), $p = 0.03$).

When taking into account the karyotype, patients with 45,X karyotype had more problematic scores than patients with other karyotypes only on the withdrawal subscale (61.3 ± 10.6 vs. 54.3 ± 7.0 , $p = 0.049$).

Self-Perception

The results of the SPP are shown in table 3. TS patients had scores comparable to those of the non-TS reference group on the majority of subscales, including intellectual

Table 2. Number of subjects with problematic scores at the Young Adult Self Report (YASR)

YASR scales	Turner group (n = 30)	Reference group (n = 44)
Internalizing		
Borderline	3 (10%)	6 (14%)
Clinical	10 (30%)	8 (18%)
Anxious-depressed		
Borderline	4 (13%)	5 (11%)
Clinical	5 (17%)	4 (9%)
Withdrawn		
Borderline	2 (7%)	2 (5%)
Clinical	3 (10%)	1 (2%)
Externalizing		
Borderline	4 (13%)	5 (11%)
Clinical	2 (7%)	6 (14%)
Intrusive behaviour		
Borderline	1 (3%)	2 (5%)
Clinical	0 (0%)	2 (5%)
Aggressive behaviour		
Borderline	2 (7%)	4 (9%)
Clinical	1 (3%)	0 (0%)
Delinquent behaviour		
Borderline	0 (0%)	1 (2%)
Clinical	0 (0%)	1 (2%)
Somatic complaints		
Borderline	1 (3%)	5 (11%)
Clinical	1 (3%)	0 (0%)
Attention problems		
Borderline	7 (23%)*	2 (5%)
Clinical	1 (3%)	1 (2%)
Thought problems		
Borderline	2 (7%)	4 (9%)
Clinical	0 (0%)	2 (5%)
Total problems		
Borderline	2 (7%)	4 (9%)
Clinical	7 (23%)	14 (32%)

* $p < 0.05$.

ability, athletic competence, physical appearance and global self-worth. In comparison with the reference group, TS women had lower scores for social acceptance (2.7 ± 0.7 vs. 3.0 ± 0.6 , $p < 0.05$), romantic relationships (2.1 ± 0.7 vs. 2.5 ± 0.6 , $p < 0.05$) and sense of humour (2.6 ± 0.7 vs. 3.1 ± 0.7 , $p < 0.01$), and higher scores for morality (3.2 ± 0.4 vs. 3.0 ± 0.4 , $p < 0.02$).

Patients with the 45,X karyotype had lower scores than those with other karyotypes for close friendship (2.7 ± 0.7 vs. 3.3 ± 0.7 , $p < 0.05$), romantic relationships (1.9 ± 0.6 vs. 2.4 ± 0.7 , $p < 0.05$) and sense of humour (2.4 ± 0.6 vs. 2.9 ± 0.6 , $p < 0.05$).

Table 3. Scores at the Self Perception Profile (SPP)

SPP subscales	Turner group	Reference group
Scholastic competence	2.8 ± 0.6	2.6 ± 0.5
Intellectual ability	2.5 ± 0.6	2.4 ± 0.5
Creativity	2.4 ± 0.6	2.5 ± 0.6
Job competence	2.8 ± 0.6	2.7 ± 0.5
Athletic competence	2.1 ± 0.6	2.2 ± 0.6
Physical appearance	2.5 ± 0.9	2.2 ± 0.8
Social acceptance	$2.7 \pm 0.7^*$	3.0 ± 0.6
Close friendships	3.0 ± 0.8	3.2 ± 0.5
Romantic relationships	$2.1 \pm 0.7^*$	2.5 ± 0.6
Parental relationships	3.2 ± 0.8	3.2 ± 0.6
Morality	$3.2 \pm 0.4^{**}$	3.0 ± 0.4
Sense of humour	$2.6 \pm 0.7^{***}$	3.1 ± 0.7
Global self-worth	2.6 ± 0.8	2.6 ± 0.6

* $p < 0.05$; ** $p < 0.02$; *** $p < 0.01$.

Table 4. Scores at the Bodily Attitude Scale (BAS)

BAS subscales	Turner group	Reference group
Appraisal	3.4 ± 0.8	3.3 ± 0.6
Attribution	4.2 ± 0.7	4.4 ± 0.4
Physical contact	3.4 ± 0.6	3.3 ± 0.5

Body Image

Table 4 shows that with respect to body image as measured by the BAS, TS patients' bodily attitude scores were comparable to those of non-TS women for appraisal, attribution as well as for physical contact. On the BAS, no significant differences were found between patients with the 45,X karyotype and those with other karyotypes.

Correlations between Test Scores and Auxological Parameters

No associations were found between the YASR and SPP scores, and height or BMI. With respect to the BAS, only a negative correlation was found between BMI and the appraisal score ($r = -0.51$; $p < 0.01$). None of the test scores was related to the ages at start of GH therapy, at start of oestrogen therapy or at menarche.

Discussion

This psychosocial evaluation of young adult women with TS reveals that these women have similar scores as age-matched women without TS with respect to most of the assessed domains. Although the TS patients in our study had been treated during many years with GH and oestrogens, they all had an adult height below the population mean, and two-thirds of the patients still had a height below the third percentile. Hence, short stature does not seem to affect psychosocial well-being at adulthood very much.

We decided to compare the data of our TS patient group with the data of an age-matched group of non-TS female students, which we consider as a reference group and not as a control group. Ideally, the results obtained in our TS group should be compared with data obtained in non-GH treated TS patients, but this was not feasible since we could not trace enough age-matched untreated TS patients to serve as a control group. We acknowledge that this is a shortcoming of the present study. As a consequence, our results can only be extended to TS patients who have been diagnosed rather early in life and have been treated with GH and oestrogens.

With respect to the presence of behavioural and emotional problems, TS patients had similar scores as the reference group on the majority of syndrome subscales and even less problematic scores on some subscales (somatic complaints, thought problems, delinquent behaviour) and on the broad-band externalizing scale. Our findings are globally in line with the YASR data reported by van Pareren et al. [13] revealing comparable behavioural problem scores between TS women and the general population. However, their results were only based upon the broad-band scales. It is somewhat surprising that our TS patients had lower scores on the somatic complaints subscale than the non-TS reference group as TS patients are often confronted with TS specific health problems [2, 3]. This may be due to the fact that the YASR somatic complaints subscale does not measure TS specific somatic problems such as hearing problems, cardiac disease, hypothyroidism or hypertension. In addition, TS patients have experience in adapting to these health problems, and probably tend to complain less about their body than non-TS females.

Significantly more TS patients than reference women received scores on the YASR attention problems subscale within the borderline and clinical range. In line with others [27], we previously reported elevated scores on the attention problems subscale of the Child Behaviour Check-

list in girls with TS, which remained unchanged during GH therapy [11]. The presence of attention problems in TS patients is a well-known feature already present at a very young age and being part of a larger cognitive-behavioural profile. Attention problems can be associated with problems of hyperactivity, distractibility, clumsiness and/or poor school performance. Several authors reported a TS specific neurocognitive phenotype consisting of impaired visual-spatial and visual-perceptual abilities, motor function, non-verbal memory, executive function and attentional abilities [6, 27–31].

Patients with the 45,X karyotype had more problematic scores for withdrawal than patients with other karyotypes. This might be due to the fact that patients with other karyotypes usually have fewer or less severe TS symptoms and/or dysmorphic features impeding social contact [32]. Further studies are needed to verify this hypothesis.

Regarding self-perception, TS patients had self-perception scores comparable to the reference group on the majority of subscales except for social acceptance, romantic relations and sense of humour, globally in line with the Dutch results [13], but somewhat in contrast to other previous studies reporting impaired self-esteem and self-confidence [4, 6, 27, 29]. Problems in social relationships, particularly in contact with the opposite sex, as reflected by a lesser number of intimate relationships or marriages, later psychosexual milestones, problems with social cues have repeatedly been reported [4–9, 18]. Our TS patient group had a lower sense of humour, which could be understood within the context of a lack of self-confidence in social relations as well as a lack of good understanding of social, especially affective, cues [28]. Our TS patients had higher scores for morality than the non-TS reference group. These higher morality scores could be seen as a way of compensation or coping, attaching more importance to or accentuating internal values rather than external values such as physical appearance. Among the TS group, patients with the 45,X karyotype had lower self-perception scores with respect to social contact and sense of humour than TS patients with other karyotypes. A similar interpretation as mentioned above could be applied, i.e. patients with a 45,X karyotype having more pronounced TS symptoms [32] could experience more problems in social relations.

The satisfaction of the TS patients with body image and/or female appearance was not different from that of the non-TS females, with similar bodily attitudes scores for appraisal, attribution as well as physical contact on the BAS, and comparable scores on the physical appearance

subscale of the SPP. The Dutch study reported a more negative body image in the TS group compared to the population sample, but BAS attribution and physical contact scores were only slightly lower [13]. We suspect that the non-problematic bodily attitudes scores in our TS group could be due to defence and/or coping mechanisms such as a tendency of minimization and denial of problems with respect to physical appearance or femininity. Since the TS specific physical characteristics and/or dysmorphic features cannot be treated or changed essentially, a way of coping, a way of adapting to this reality is trying to minimize the importance of physical appearance and to accentuate the importance of other aspects in life.

When analyzing the potential somatic and clinical correlates of the psychological test scores in the TS patient group BMI, reflecting obesity, a common problem in adult TS [2, 33], was a more important determinant than height. Bodily attitudes scores on the appraisal subscale of the BAS were inversely related to BMI, i.e. lower bodily appraisal scores were related to a higher BMI. Other clinical determinants such as height, age at start of GH therapy, age at start of oestrogen therapy and age at menarche were not related to any of the test scores.

Our findings are in line with those from other studies demonstrating that height does not have a significant impact on psychological functioning [9, 13, 17, 18]. For other somatic correlates discrepant results were found. In contrast to our findings, Wide-Boman et al. [18] reported that BMI was not related to psychological well-being. Some studies demonstrated that late induction of puberty and health problems associated with TS (hearing impairment and cardiac problems) had a negative impact on quality of life or well-being [17, 18]. A complex interplay of factors is probably responsible for these divergent find-

ings such as different treatment regimens (late pubertal induction, no oestrogen treatment at adult age), the choice of the studied somatic and psychological parameters, and age differences of the studied TS patients impeding a valid comparison of data from different publications.

Conclusions

In conclusion, our findings revealed that young adult patients with TS, diagnosed at an early age and treated during childhood with GH and oestrogens if indicated, did not report more behavioural and emotional problems compared to age-matched non-TS women except attention problems. TS patients even reported fewer problems than non-TS females at some subscales. Although TS may have an important impact on physical appearance, TS patients did not differ from non-TS women in their bodily satisfaction. In line with previous studies, TS patients perceived themselves as less socially competent, particularly patients with a 45,X karyotype. BMI was the only somatic correlate related to the bodily attitudes scores. The medical and psychological follow-up of adult TS patients should not neglect the problem of overweight and associated psychosocial consequences.

Acknowledgements

This work was supported by a research grant from the Belgian Study Group for Paediatric Endocrinology. The authors express their thanks to all the members of the BSGPE who invited patients to participate to this study. Part of this work was previously published in abstract form [Horm Res 2005;64(suppl 1):211] and was presented as a mini poster at the ESPE/LWPES 7th Joint Meeting Paediatric Endocrinology, Lyon, september 2005.

References

- 1 Ranke M, Saenger P: Turner's syndrome. *Lancet* 2001;358:309-314.
- 2 Ostberg J, Conway G: Adulthood in women with Turner syndrome. *Horm Res* 2003;59: 211-221.
- 3 Verlinde F, Massa G, Lagrou K, Froidecoeur C, Bourguignon JP, Craen M, De Schepper J, Du Caju M, Heinrichs C, Francois I, Maes M: Health and psychosocial status of patients with Turner syndrome after transition to adulthood: the Belgian experience. *Horm Res* 2004;62:161-167.
- 4 Mc Cauley E, Sybert VP, Ehrhardt AA: Psychosocial adjustment of adult women with Turner syndrome. *Clin Genet* 1986;29:284-290.
- 5 Aran O, Galatzer A, Kauli R, Nagelberg N, Robicsek Y, Laron Z: Social, educational and vocational status of 48 adult females with gonadal dysgenesis. *Clin Endocrinol* 1992;36: 405-410.
- 6 Deloos J, Van Den Berghe H, Swillen A: Turner syndrome patients as adults: a study of their cognitive profile, psychosocial functioning and psychopathological findings. *Genet Couns* 1993;4:169-179.
- 7 Pavlidis K, Mc Cauley E, Sybert VP: Psychosocial and sexual functioning in women with Turner syndrome. *Clin Genet* 1995;45:85-89.
- 8 Morabito F, Guzzaloni G, De Luca F, Matarazzo P, Pullano V, Pozzan GB, Rigon F, Stoppoloni GP: Turner syndrome: psychosocial functioning in adulthood. *Acta Med Auxol (Milano)* 1998;30:153-159.

- 9 Dörholt D, Noeker M, Ranke MB: Body height, body image and general well-being in adult women with Turner's syndrome; in Eiholzer U, Haverkamp F, Voss LD (eds): *Growth, Stature and Psychological Well-being*. Seattle, Hogrefe & Huber, 1999, pp 95–103.
- 10 Wide-Boman UW, Bryman I, Halling K, Moller A: Women with Turner syndrome: psychological well-being, self-rated health and social life. *J Psychosom Obstet Gynaecol* 2001;22:113–122.
- 11 Lagrou K, Xhrouet-Heinrichs D, Heinrichs C, Craen M, Chanoine JP, Malvaux P, Bourguignon JP: Age-related perception of stature, acceptance of therapy, and psychosocial functioning in human growth hormone-treated girls with Turner's syndrome. *J Clin Endocrinol Metab* 1998;83:1494–1501.
- 12 Siegel PT, Clopper R, Stabler B: The psychological consequences of Turner syndrome and review of the National Cooperative Growth Study psychological substudy. *Pediatrics* 1998;102:488–491.
- 13 van Pareren YK, Duivenvoorden HJ, Slijper FME, Koot HM, Drop SLS, de Muinck-Keizer-Schrama SMPF: Psychosocial functioning after discontinuation of long-term growth hormone treatment in girls with Turner syndrome. *Horm Res* 2005;63:238–244.
- 14 Ross JL, Mc Cauley E, Roeltgen D, Long L, Kushner H, Feuillan P, Cutler GB Jr: Self concept and behavior in adolescent girls with Turner syndrome: potential estrogen effects. *J Clin Endocrinol Metab* 1996;81:926–931.
- 15 Ross JL, Roeltgen D, Feuillan P: Effects of estrogen on nonverbal processing speed and motor function in girls with Turner's syndrome. *J Clin Endocrinol Metab* 1998;83:3198–3204.
- 16 Ross JL, Roeltgen D, Feuillan P: Use of oestrogen in young girls with Turner Syndrome. Effects on memory. *Neurology* 2000;54:164–170.
- 17 Carel JC, Ecosse E, Bastie-Sigeac I, Cabrol S, Tauber M, Léger J, Nicolino M, Brauner R, Chaussain JL, Coste J: Quality of life determinants in young women with Turner's syndrome after growth hormone treatment: results of the StaTur population-based cohort study. *J Clin Endocrinol Metab* 2005;90:1992–1997.
- 18 Wide-Boman U, Bryman I, Möller A: Psychological well-being in women with Turner Syndrome: somatic and social correlates. *J Psychosom Obstet Gynecol* 2004;25:211–219.
- 19 Groeicurven Vlaanderen, Laboratorium Antropogenetica Vrije Universiteit, Brussel, en Dienst Jeugdgezondheidszorg, Katholieke Universiteit, Leuven, 2004. Available at www.vub.ac.be/groeicurven.
- 20 Achenbach M: *Manual for the Cross-Informant Program for the Young Adult Self Report and Young Adult Behavior Checklist*. Burlington, University of Vermont, Department of Psychiatry, 1997.
- 21 Ferdinand RF, Verhulst FC: The prevalence of self-reported problems in young adults from the general population. *Soc Psychiatry Psychiatr Epidemiol* 1996;31:10–20.
- 22 Lagrou K, Froidecoeur C: *French Adaptation of the Young Adult Self Report*. Brussels, BSGPE, 2002.
- 23 Lagrou K: *Flemisch Adaptation of the Young Adult Self Report*. Brussels, BSGPE, 2002.
- 24 Harter S, Neemann J: *Manual for the Self-Perception Profile for College Students*. Denver, University of Denver, 1986.
- 25 Baardman I: *Ingebeelde lelijkheid [Imagined ugliness]*. Amsterdam, Vrije Universiteit Amsterdam, 1989, (Adaptation française, Lagrou K, Froidecoeur C, Brussels, BSGPE, 2002; Vlaamse aanpassing, Lagrou K, Brussels, BSGPE, 2002).
- 26 Simis KJ, Verhulst FC, Koot HM: Body image, psychosocial functioning, and personality: how different are adolescents and young adults applying for plastic surgery? *J Child Psychol Psychiatry* 2001;42:669–678.
- 27 McCauley E, Kay T, Ito J, Treder R: The Turner Syndrome: cognitive deficits, affective discrimination, and behavior problems. *Child Dev* 1987;58:464–473.
- 28 El Abd S, Turk J, Hill P: Annotation: psychological characteristics of Turner Syndrome. *J Child Psychol Psychiatr* 1995;36:1109–1125.
- 29 McCauley E, Ross JL, Kushner H, Cutler G: Self-esteem and behavior in girls with Turner syndrome. *J Dev Behav Pediatr* 1995;16:82–88.
- 30 Ross J, Roeltgen D, Zinn A: Cognition and the sex chromosomes: studies in Turner syndrome. *Horm Res* 2006;65:47–56.
- 31 Skuse D, Percy EE, Stevenson J: Psychological functioning in the Turner Syndrome: a national survey; in Stabler B, Underwood LF (eds): *Growth, Stature and Adaptation: Behavioral, Social, and Cognitive Aspects of Growth Delay*. Chapel Hill, University of North Carolina, 1994, pp 151–164.
- 32 Hall J: Turner syndrome and its variants. *Pediatr Clin North Am* 1990;37:1421–1440.
- 33 Elsheikh M, Dunger D, Conway G, Wass A: Turner's syndrome in adulthood. *Endocr Rev* 2002;23:120–140.