Sexuality and Reproductive Health in Women With Congenital Heart Disease

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The different biopsychosocial periods in a woman's life are all interactively associated with the cardiovascular system. The present study was designed to address questions related to sexuality and reproductive health in a large cohort of women with congenital heart disease. Overall, 536 women (median age 29 years, range 18 to 75) completed a questionnaire during their visit at 2 tertiary care centers for congenital heart disease. Patients were categorized according to their functional class and according to the degree of severity of the underlying heart defect. The median age at menarche was significantly delayed in patients with functional class III-IV and in women with complex or cyanotic anomalies. More than 1/4 of the women (29%) had at least once sought medical advice for menstrual discomforts, and the proportion was significantly increased for those in the worst functional class (49%, $p < 0.001$) and for patients with a cyanotic heart defect (43%, $p = 0.03$). Overall, 9% reported increased or altered symptoms related to their heart defect during sexual activity. This proportion increased significantly with worsening functional class (6%, 11%, and 26% in functional class I, II, and III-IV, respectively; $p = 0.001$), increased severity (5%, 8%, and 17% for simple, moderate, and severe heart defects, respectively; $p = 0.005$), and in women with cyanosis (8% and 28% in acyanotic and cyanotic patients, respectively; $p < 0.001$). In conclusion, to ensure high-quality care for this demanding and growing patient population, physicians must be aware that issues related to the entire reproductive cycle should be considered when counseling these patients. **(Am J Cardiol 2010;105:538–541)**

The different biopsychosocial periods in a woman's life, including menarche, sexuality, pregnancy, and menopause, are all interactively associated with the cardiovascular system.[1] Nevertheless, contemporary data regarding the sexual and reproductive health of women with congenital heart disease (CHD) are scarce. Most studies have been concerned with pregnancy-related health issues,[2] and only a few have explored sexuality and other aspects of reproductive health in this patient population.[3–5] Currently, most recommendations and patient information for women with CHD have been based solely on expert knowledge because existing scientific evidence has not provided enough information to design adequate individual counseling strategies. The present study was designed to address questions related to sexuality and reproductive health in a large cohort of women with CHD, with the aim of providing an overview of the actual situation and generate a basis for future prospective and clinical studies.

Methods

During a 12-month period, 536 consecutive adult female patients with CHD, who were seen at the outpatient clinic of 2 tertiary care centers for adults with CHD (Deutsches Herzzentrum München and Deutsches Herzzentrum Berlin) were included. The inclusion criteria were confirmed CHD, age ≥18 years, and written consent. The lack of cognitive competency to understand and complete the questionnaire was the exclusion criterion.

The women were required to complete a questionnaire designed for self-administration. This questionnaire covered different aspects, including demographics and sexual and reproductive health issues. A separate questionnaire was compiled by the treating physician, including cardiac and noncardiac diagnoses and surgical and pharmacologic treatment. The medical records were obtained from all participating patients and reviewed, if necessary.

The medical and surgical records were reviewed for anatomic characteristics before repair and for details of surgical repair and reoperation. Using the medical history and clinical assessment findings, the attending physician classified the patients according to 1 of 4 functional classes.[6] This clas-

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Table 1
Baseline characteristics of study participants (n = 536)

Variable	Value	Missing Data
Age (years)		0
Median	29	
Range	18–75	
Functional class		20
I	264 (51%)	
II	211 (41%)	
III–IV	41 (8%)	
Congenital heart disease severity*		0
Simple	127 (24%)	
Moderate	275 (51%)	
Severe	134 (25%)	
Operative or interventional treatment		1
Native	137 (26%)	
Interventional	41 (8%)	
Reparative	300 (56%)	
Palliative	57 (11%)	
Reoperated	110 (20%)†	
Cyanosis	44 (8%)	5
Among these: Eisenmenger syndrome	24 (5%)	23
History of thromboembolism‡	52 (10%)	24
History of infective endocarditis	20 (4%)	18
History of heart failure	60 (12%)	21
Arterial hypertension	39 (7%)	16
Current smokers	56 (11%)	26

* According to American College of Cardiology classification.
† Percentage of those who underwent surgery.
‡ Included patients with a history of thrombosis, pulmonary embolism, and/or a cerebrovascular event.

Table 2
Congenital heart defect diagnoses of study participants (n = 536)

Main Cardiac Diagnosis	n (%)	Native/Operated	Median Age (years)
Tetralogy of Fallot	67 (12%)	0/67	30 (18–48)
Transposition of great arteries	52 (10%)	0/52	28 (18–46)
Ventricular septal defect	50 (9%)	28/22	27 (18–54)
Atrial septal defect	46 (9%)	10/36	30 (19–75)
Coarctation of aorta	39 (7%)	1/38	27 (18–60)
Aortic stenosis	34 (6%)	15/19	28 (18–46)
Ebstein's anomaly	25 (5%)	6/19	45 (19–70)
Pulmonary stenosis	24 (4%)	10/14	27 (19–68)
Patent foramen ovale	22 (4%)	7/15	40 (22–66)
Marfan syndrome	15 (3%)	11/4	34 (20–51)
Atrioventricular septal defect (total)	15 (3%)	4/11	30 (20–65)
Tricuspid atresia	13 (2%)	3/10	29 (18–42)
Mitral valve prolapse	12 (2%)	9/3	27 (19–41)
Pulmonary atresia and ventricular septal defect	10 (2%)	2/8	31 (23–47)
Atrioventricular septal defect (partial)	10 (2%)	0/10	31 (19–43)
Truncus arteriosus communis	9 (2%)	2/7	30 (19–41)
Congenitally corrected transposition of great arteries	9 (2%)	1/8	37 (24–60)
Persistent ductus arteriosus	8 (1%)	3/5	26 (18–59)
Double inlet ventricle	8 (1%)	2/6	26 (21–51)
Other*	68 (13%)	23/45	28 (19–62)
Total	536	137/399	29 (18–75)

Data in parentheses are ranges, unless otherwise noted.
* Double outlet right ventricle (n = 10), aortic regurgitation (congenital, n = 7), subaortic stenosis (n = 6), cardiomyopathy (congenital, n = 6), partial anomalous pulmonary venous connection (n = 6), aortic anomalies (congenital, n = 5), mitral regurgitation (congenital, n = 5), pulmonary atresia (n = 4), tricuspid regurgitation (congenital, n = 4), arrhythmias (congenital forms, n = 3), cor triatriatum (n = 2), double-chamber right ventricle (n = 2), Bland-White-Garland syndrome (n = 2), supravalvular aortic stenosis (n = 2), aortopulmonary window (n = 1), arrhythmogenic right ventricular dysplasia (n = 1), interrupted aortic arch (n = 1), and myocardial noncompaction (n = 1).

sification was specially developed for adults with CHD and is similar to the New York Heart Association classification for patients with heart failure. Only 2 patients were in functional class IV. To allow statistical analysis, they were grouped with the 39 patients with functional class III, forming functional class III-IV, a group of symptomatic patients with restrictions even in performing daily activities.

For additional analysis, the patients were assigned a severity code. This codification followed the recommendation of the American College of Cardiology and facilitated the allocation of patients to 1 of 3 degrees of severity (simple, moderate, or severe) depending on the underlying cardiac anomaly and postoperative status.[7]

The data were analyzed using the Statistical Package for Social Sciences, version 12.0 (SPSS, Chicago, Illinois). The descriptive statistics of continuous variables were calculated as the mean ± SD or as the median, in the case of a non-normal distribution. Nominal variables are expressed as frequencies and percentages. Chi-square tests were used to detect differences in the nominal variables between groups, and, if >20% of the expected counts were <5, Fisher's exact test was applied. Differences between continuous variables were measured with unpaired *t* tests and with the Mann-Whitney *U* test when the data did not meet the assumption of normal distribution. Odds ratios were calculated from 2 × 2 tables and are presented with the 95% confidence intervals. The intimate nature of the questioned information might have prevented some of the participants from answering some of the questions. This same reason made on-site control of the completeness of the compiled questionnaires impossible to guarantee maximum confidentiality. Therefore, relative percentages of the answers were calculated, and the number of missing information was always reported for the respective questions.

The institutional ethics committees of the 2 participating centers approved the study.

Results

In the 12-month recruitment period, 536 adult women with CHD and a median age of 29 years (range 18 to 75) were included in the present study. Some baseline characteristics and the diagnoses of the included patients are listed in Tables 1 and 2. The first menarche, as the culmination of a series of physiologic processes of female puberty, occurred at a mean age of 13.0 ± 1.6 years (range 9 to 19, missing data for 15). Women with more complex heart

Table 3
Mean age at menarche and proportion of women with menstrual discomfort and cardiac complaints during menstruation (n = 536)

Variable	Age at Menarche (years)	p Value	Missing Values	Menstrual Discomfort*	p Value	Missing Values	Cardiac Complaints During Menstruation	p Value	Missing Values
Functional class		0.071	36		<0.001	68		0.001	49
I	13.2			50 (21%)			9 (4%)		
II	13.6			65 (33%)			20 (10%)		
III–IV	13.5			17 (49%)			7 (18%)		
Heart defect severity		<0.001	16		0.119	50		0.205	29
Simple	13.1			24 (21%)			5 (4%)		
Moderate	13.3			74 (30%)			24 (9%)		
Severe	14.1			41 (33%)			10 (8%)		
Cyanosis		0.001	21		0.030	54		0.029	34
No	13.4			119 (27%)			32 (7%)		
Yes	14.2			18 (43%)			7 (16%)		

* Only menstrual discomfort for which medical advice was sought was considered.

Table 4
Mean age at first sexual intercourse and proportion of women with cardiac complaints during sexual activity (n = 536)

Variable	Age at First Sexual Intercourse (years)	p Value	Missing Values	Cardiac Complaints During Sexual Intercourse	p Value	Missing Values
Functional class		0.004	68		0.001	87
I	17.3			14 (6%)		
II	17.9			19 (11%)		
III–IV	18.5			9 (26%)		
Heart defect severity		0.130	74		0.005	69
Simple	17.3			6 (5%)		
Moderate	17.7			19 (8%)		
Severe	18.0			19 (17%)		
Cyanosis		0.129	55		<0.001	74
No	17.6			34 (8%)		
Yes	18.3			10 (28%)		

anomalies and women with a cyanotic heart defect were significantly older at their first menarche (Table 3).

Of 486 patients (missing data for 50), 139 (29%) had at least once sought medical advice for menstrual discomforts. The most frequent complaint was menstrual pain (23%), followed by cycle irregularities (17%), severe menstrual bleeding (14%), and amenorrhea (5%). Women taking antiplatelet or antithrombotic medication did not differ in the reported frequency of menstrual irregularities, with the exception of women taking anticoagulant medication, for whom an almost threefold increased risk of menorrhagia was found (odds ratio 2.8, 95% confidence interval 1.6 to 5.1). Overall, the proportion of women complaining of menstrual discomfort was significantly greater in the worst functional class and in patients with a cyanotic heart defect (Table 3).

Furthermore, 8% of the participants (missing data for 29) complained of increased or modified cardiac complaints during menstruation, with the rates particularly high among women in the worst functional class and among women with cyanosis. The proportion of women with increased cardiac complaints during menstruation did not differ significantly among the degrees of severity. Increased fatigue, dyspnea, chest pain, tachycardia, impression of arrhythmia, and dizziness were most frequently cited (Table 3).

Of all the patients, 6% (n = 35) reported never having had sexual intercourse. Of the remaining 501 women, 450 provided their age at their first sexual intercourse. The mean age was 17.7 ± 2.5 years (range 12 to 32). Of these women, 15% (n = 69) had had their first sexual intercourse at ≤15 years of age (Table 4).

Overall, 9% (missing data for 34) reported increased or altered symptoms related to their heart defect during sexual activity. This proportion increased significantly with worsening functional class, increased degree of severity, and cyanosis. Of the complaints during sexual activity, dyspnea, perceived arrhythmia, increased fatigue, and syncope were reported most (Table 4).

Discussion

Our study on the specific sexual and reproductive health-related problems has presented data from >500 sexually mature women with nearly all types of congenital cardiac anomalies (native, after surgery, or interventional treatment) and across all age groups. According to our data, the median age of the participating women at menarche was 13.0 years. This is close to the 12.8 years reported for the general German population[8] but younger than the 13.3 to 13.4 years found in other studies of patients with CHD.[3,9] Menarche was significantly delayed in women with complex or cyanotic anomalies.

Furthermore, >1/4 of the surveyed women had at least once experienced one or more types of menstrual disorders.

Because we had to rely on subjectively reported data, we included only discomfort for which at least once medical advice had been sought in the analysis. An increased risk of menstrual disorders and menstrual irregularities has been previously reported. In those studies, the proportion of menstrual problems was significantly associated with the presence of cyanosis, the number of surgical interventions, and the severity of the disease.[3,9] This is in line with our findings in which the prevalence of menstrual disturbances was significantly increased in the worst functional classes and in cyanotic patients.

In addition, cardiac complaints related to the heart defect seem to deteriorate during the menstrual period in some affected women. Again, this observation was more pronounced in the worst functional classes and in cyanotic patients. The causal biologic pathway between the cardiac anomaly and ovarian function has never been analyzed in depth and no prospective data are available. It has been hypothesized that these abnormal menstrual patterns represent recurrent anovulatory cycles, dysfunction of the hypopituitary-ovarian axis, or disturbed uterine hemostasis due to chronic hypoxemia or hyperviscosity.[9] In addition to the cardiac defect itself, repeated surgical intervention during childhood might have interfered with the complex physiologic processes involved in the ovarian cycle.

The clinical implications of chronic anovulation, such as an increased risk of endometrial hyperplasia and the formation of polyps, fibroids, and histologic atypias, must be considered.[10–12] Menorrhagia after anovulatory cycles is a relevant cause of iron-deficiency anemia. In a recent large study of >300,000 women with heavy uterine bleeding, >25% had a diagnosis of anemia, and these were significantly more likely to require emergency admission and blood transfusions.[13] Furthermore, menorrhagia has been named a possible prothrombotic condition in itself, increasing the risk of thrombotic events.[14]

To explore the biologic pathways between congenital cardiac anomalies and the ovarian cycle, additional studies, including the analysis of hormones and biomarkers, are required.

The median age at the first sexual intercourse of the included women was 17.7 years. This is within the age range of 16.5 to 18.5 years for European countries and close to the average of 17.5 years in the German population.[15–16] However, 15% of the women reported engaging in sexual activity for the first time at ≤15 years old. This fact underlines the necessity for adequate and timely counseling at an early age. Aggravated symptoms during sexual activity related to the cardiac situation in >1/4 of women with functional class III-IV, as well as in the group of cyanotic patients, should be considered. The fear of physical overexertion or an impaired body image can furthermore interfere with a satisfying sexual life and should be considered during counseling.[17,18]

The limitations of the present study were its cross-sectional design and the lack of a control group. Furthermore, the study was performed at 2 tertiary care centers for adults with CHD. Thus, the sample of patients might not represent the typical population with CHD seen by a general practitioner or a cardiologist. The prevalence of more complex anomalies seen at both institutions was likely to be greater than that seen in either community-based hospitals or cardiology departments.

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