

The Psychopathological Influence of Congenital Heart Disease in Korean Male Adolescents: An Analysis of Multiphasic Personal Inventory Test Results

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Purpose: The aim of this study was to evaluate the psychopathological influence of congenital heart disease (CHD) in Korean 19-year-old males. **Materials and Methods:** The authors compared the Korean military multiphasic personal inventory (KMPI) military profiles of 211 CHD cases (atrial septal defect, ventricular septal defect, patent ductus arteriosus, or combined CHD) with the KMPI profiles of 300 normal controls. The CHD group was also divided according to whether or not the subjects had undergone open cardiac surgery in order to evaluate the psychopathological effects of an operation among the subjects. **Results:** A decreased result on the faking-good response scale and an increased result on the faking-bad response were observed in the CHD group compared to the control ($p < 0.01$). The neurosis scale results, including anxiety, depression and somatization symptoms, were markedly increased in the CHD group compared to the control ($p < 0.01$). The severity level of personality disorder was also increased in the CHD group ($p < 0.001$). Differences in KMPI scale scores were not related to open cardiac surgery history. **Conclusion:** In this study, young males with CHD tended to report more abnormal results on the multiphasic personal inventory test in comparison to normal subjects, suggesting that CHD may be related to psychopathology in young males in Korea. Therefore, clinicians are recommended to evaluate the psychopathological traits of patients with CHD.

Key Words: Congenital heart disease, multiphasic personal inventory, psychopathology, Korea, conscription

INTRODUCTION

Living with heart disease entails many psychosocial consequences for adolescents.¹ Previous studies have reported higher levels of psychological distress and behavioral problems in these individuals compared to healthy adolescents.²⁻⁵ However, other studies have reported lower levels of psychological distress or no difference thereof in comparison to control groups.^{6,7} These contrasting reports raise question to the psychological influence of heart disease on adolescents. This study,

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therefore, reviewed multiphasic personal inventory test scores obtained by the Korean Military Manpower Administration upon conscription into the military to examine the psychological influence of congenital heart disease (CHD) in Korean male adolescents.

MATERIALS AND METHODS

By law, Korea requires all males to be examined by the Military Manpower Administration for conscription into the military. Over the course of this examination, examinees are administered the Korean military multiphasic personality inventory test (KMPI). Using the scores obtained from April to November 2011, we assessed the data of normal healthy volunteers and examinees with CHD. All examinees in this study comprised 19-year-old males tested at the Seoul Regional Military Manpower Administration.

Normal group subjects ($n=300$) were interviewed by one physician and exhibited no medical history, including that of heart conditions, as well as no history of psychological problems. Confirmation of CHD in CHD subjects (211 cases) was corroborated by a medical certificate and examination of medical records during the conscription process; CHD type was included among these records. In this study, to examine the psychopathological effects of an operation, the KMPI results for cases with a history of open cardiac surgery were compared to those without such history.

The KMPI is a revised version of the conventional Minnesota multiphasic personality inventory test (MMPI) adjusted for Korean conscription.⁸⁻¹⁰ The KMPI was created in five stages. First, several military-associated questions were added to the pre-existing MMPI. A pre-test (575 questions) for suitability was administered to normal soldiers, normal university students, military prisoners, military hospital psychiatric patients and private hospital psychiatric patients. After this, three scales (a validity scale, clinical scale and content scale) were established and divided according to several profiles, similar to the MMPI. To finalize the examination, score standardization and a yield of distinct function were performed. The KMPI is similar to the MMPI in its overall aspects.⁹ The KMPI also sets scores for each scale, which are transformed into a standardized T-score. Therefore, by comparing the T-scores of each group, we can easily measure trends in personality and psychopathology.

Several item groups are analyzed by the KMPI, such as a response set, neurosis set, psychopathy set, accident set, pre-

diction set of accidents, and a special set. If results on any one of these scales exceed the normal range, the data were automatically categorized by a computer as an abnormal result. In this study, abnormal results were divided into three types: Response set (a fake-good response, a fake-bad response, and infrequency scale), neurosis set (anxiety, depression, and somatization), and psychopathy set (schizophrenia, personality disorder, and paranoia). Evaluation of statistical significance of differences was carried out using Student's *t*-tests. Tests were considered significant at *p*-values of less than 0.05. Statistical comparisons were analyzed using SPSS software version 12.0 (SPSS Inc., Chicago, IL, USA).

RESULTS

In this study, all 511 examinees were 19 years old, male, and lived in Seoul. Between the two groups, height and weight were 174.8 ± 5.8 cm and 70.9 ± 13.7 kg in the normal group, and 175.8 ± 5.5 cm and 69.6 ± 11.0 kg in the CHD group, which was not statistically different ($p=0.225$ and 0.385 , respectively). In both groups, examinees with psychological problems (depression, anxiety disorder, schizophrenia, etc.) were excluded. Table 1 lists the types of CHD reported in this study. Atrial septal defect was present in 49 cases (23.2%), of which 37 had undergone an operation. Ventricular septal defect accounted for 136 cases (64.5%), with 104 cases having undergone an operation. Nineteen cases (9.0%) of patent ductus arteriosus and 7 cases of complex CHD were included, all of which involved an operation. Because the data were derived from conscription data during the restricted period (from April to November 2011), complex CHD was infrequent compared to the other types.

Table 2 summarizes the KMPI results for the normal group and the CHD group. The proportion of abnormal results for the response set, the neurosis set, and the psychopathy set on the KMPI were compared between the two groups. There were more abnormal results in the CHD group (15.2%) than in the normal group (8.7%, $p=0.023$). In addition, results on the fake-good and fake-bad response scales, the neurosis set (anxiety, depression, and somatization scale), and the personality disorder scale were all significantly different between the two groups. The fake-good response scale showed decreased results in the CHD group compared to the normal group ($p=0.000$). Fake-bad responses were, in contrast, greater in the CHD group ($p=0.001$). The infrequency scale did not differ by group. In the neurosis set, all

the scales of anxiety, depression, and somatization were markedly increased in the CHD group ($p=0.005$, 0.000 and 0.000 , respectively). In the psychopathy set, only the personality disorder scale was increased in the CHD group ($p=0.000$), and no other differences were present.

We then further separated CHD subjects according to history of open cardiac surgery. Accordingly, 44 cases involved no surgical correction, whereas 167 had received open cardiac surgery. Table 3 shows the KMPI results for these two subgroups. There were no differences between

Table 1. Types of Congenital Heart Disease

Type of congenital heart disease	Non-operated case	Operated case	Total
Atrial septal defect (ASD)	12	37	49
Ventricular septal defect (VSD)	32	104	136
Patent ductus arteriosus (PDA)	-	19	19
VSD+patent foramen ovale (PFO)	-	3	3
VSD+PDA+pulmonary stenosis (PS)	-	2	2
VSD+PDA+PS+tricuspid stenosis (TS)	-	2	2
Total	44	167	211

Table 2. Korean Military Multiphasic Inventory Test Results for the Normal Group and the Congenital Heart Disease Group

Korean military multiphasic inventory test	Normal volunteer group (n=300)	Congenital heart disease group (n=211)	<i>p</i> value
Abnormal result (n, %)	26 (8.7)	32 (15.2)	0.023
Response set (mean±SD)			
Fake-good response	52.72±8.19	49.84±9.47	0.000
Fake-bad response	46.36±8.04	49.01±9.04	0.001
Infrequency scale	48.56±7.46	48.95±7.85	0.570
Neurosis set (mean±SD)			
Anxiety	46.85±8.07	48.94±8.55	0.005
Depression	47.42±8.06	50.30±8.16	0.000
Somatization	48.82±9.15	53.10±10.55	0.000
Psychopathy set (mean±SD)			
Schizophrenia	47.39±7.48	48.45±7.96	0.126
Personality disorder	45.38±7.15	48.16±8.46	0.000
Paranoid	47.69±8.94	48.34±9.02	0.426

SD, standard deviation.

Table 3. KMPI Results for the Congenital Heart Disease Group according to History of Open Cardiac Surgery

Korean military multiphasic inventory test	Non-open surgery group (n=44)	Open surgery group (n=167)	<i>p</i> value
Abnormal result (n, %)	6 (13.6)	26 (15.6)	0.752
Response set (mean±SD)			
Fake-good response	46.23±10.81	50.84±8.88	0.004
Fake-bad response	48.00±7.49	49.28±9.41	0.406
Infrequency scale	48.50±5.18	49.07±8.42	0.668
Neurosis set (mean±SD)			
Anxiety	49.73±9.28	48.71±8.38	0.486
Depression	51.86±8.51	49.88±8.05	0.152
Somatization	54.36±10.70	52.77±10.52	0.373
Psychopathy set (mean±SD)			
Schizophrenia	48.59±8.62	48.41±7.81	0.892
Personality disorder	49.95±9.33	47.69±8.18	0.114
Paranoid	50.05±12.32	47.93±7.92	0.167

SD, standard deviation.

the two groups except for an increase on the fake-good response scale in the open cardiac surgery group ($p=0.004$).

DISCUSSION

The multiphasic personality inventory is designed to assist in identifying personality structures and psychopathology.¹¹ The Minnesota multiphasic personality inventory (MMPI) is one of the most frequently used personality tests in the mental health field.^{12,13} It also has wider applicability and use; for example, it is used in law to identify malingering claims.¹⁴ However, this test has not been commonly applied in the thoracic surgical field, and few have studied psychopathological abnormality in patients with CHD.¹⁵⁻¹⁷

On the MMPI, there are ten clinical scales: hypochondriasis (concern with bodily symptoms); depression (depressive symptoms); hysteria (fixation on problems and vulnerabilities); psychopathic deviate (conflict, struggle, anger, respect for society's rules); masculinity/femininity (stereotypical masculine or feminine interests/behavior); paranoia (level of trust, suspiciousness, sensitivity); psychasthenia (worry, anxiety, tension, doubts, obsessiveness); schizophrenia (odd thinking and social alienation); hypomania (level of excitability), and social introversion (people orientation).¹⁸ MMPI analysis focuses on the relative elevation of profiles in comparison to profiles of various normal groups. Raw scores are transformed into standardized metric scores, T-scores, in order to facilitate clinical interpretation.

In this study, the KMPI was applied, which is an adjusted form of the MMPI. In this study, only three sets of the KMPI were used. Of these, the response set comprised the fake-good response, fake-bad response, and the infrequent response scale. People sometimes fake good responses (faking-good response) when they feel it will serve their interests, skewing their answers so as to put them in what they perceive to be a good light. The opposite of this is to fake a bad response. The infrequent response scale detects infrequent responding among psychopathological populations. Second, the neurosis set comprised anxiety, depression, and somatization scales, revealing the respondent's tendency toward these neurotic statuses. Third, the psychopathy set comprised schizophrenia, personality disorder, and paranoia subscales, which, again, revealed tendencies toward these conditions.

As shown in Table 2, young males with CHD tended to demonstrate more abnormal results on the multiphasic personal inventory test compared to normal subjects. Decreased

results on the fake-good response scale and increased results on the fake-bad response scale were observed in the CHD group compared to the normal group. Neurosis set responses were also markedly increased in the CHD group. In addition, personality disorder scale scores were also elevated in the CHD group. Accordingly, CHD conditions may significantly impact the psychological state of adolescents.

In previous literature, the multiphasic personal inventory test was used to assess quality of life in CHD and heart disease populations. Most of these studies indicated that CHD subjects involved poorer psychological and quality of life outcomes than normal controls, similar to the results of this study. Spijkerboer, et al.¹⁹ described behavioral and emotional problems in children with CHD, while Miatton, et al.²⁰⁻²² reported that children with CHD experienced more depressive symptoms than their healthy peers and displayed a neuropsychological profile that involved motor deficits that were generally mild, subtle difficulties with language, attention/executive functioning and memory problems, and lower school performance. Another study by Ríos-Martínez, et al.²³ concluded that the diseases associated with the heart involve psychological consequences as well as physical ones, but that the degree of psychological consequences depends on the type of heart disease. In a study by Geyer, et al.,²⁴ the scales of somatization, obsessive-compulsive thoughts, interpersonal sensitivity, anxiety, hostility and paranoid ideation were markedly different between patients with CHD and controls, using a brief symptom inventory for measurement.

However, a few reports that do not support these hypotheses, reporting lower levels of psychological distress or even no differences in CHD subjects compared to controls.^{6,7} A study by Rose, et al.,²⁵ concerning the quality of life of patients with CHD, indicated CHD exerted little effect on the psychological and social aspects of quality of life. Utens, et al.² also reported a negative correlation between child behavioral and emotional scores and CHD. Steinhausen and Bruhn²⁶ further described children with CHD to be psychologically normal rather than deviant. Moreover, these studies further documented that CHD subjects may even exhibit better psychological and quality of life outcomes than those of normal populations. Such depends on the degree of their disease that CHD subjects have carried on, and factors concerning personality development are essential in determining these outcomes.²⁷

Although there are conflicting opinions about the psychological influence of CHD, it is nevertheless important to provide psychological support to CHD children and psy-

chological advice to parents.²⁸ This is because the common denominators for poor physical and psychological quality of life in patients with CHD primarily involve, as Chen, et al.²⁹ reported, personality traits, psychological distress levels and family support.

Because the personal inventory test results were significantly different between the CHD and normal group in this study, it was hypothesized that cardiac surgery could be a trigger of abnormal personality or psychopathology. However, the scales used in this study were not correlated with CHD operation history, except for the fake-good response scale (Table 2). No previous studies have considered the psychopathological influence of cardiac surgery, although some have addressed this in relation to the severity of CHD, with mixed results. Cohen, et al.³⁰ reported that adolescents with severe heart disease exhibited higher levels of depression mood and lower self-esteem than did adolescents with moderate to mild heart disease and age-matched healthy controls. However, Chen, et al.²⁹ reported that quality of life in adolescents with CHD was not associated with disease severity. Further research is needed to assess this issue.

This study has some limitations. First, the KMPI has not been widely documented or analyzed in the literature because it was purposefully designed in the unique context of military conscription.³¹ However, the KMPI has been officially approved for use by the Korean government, as with the MMPI.¹⁶⁻¹⁸ Second, only males were included in this study because the data was sourced from the military conscription examinations. Despite these limitations, however, the multiphasic personal inventory test may remain a useful tool for identifying personality changes or psychopathologies in CHD patients.

In conclusion, in this study, young males with CHD tended to report more abnormal results on the multiphasic personal inventory test in comparison to normal subjects, particularly on the scales for faking a good response, faking a bad response, anxiety, depression, somatization, and personality disorder, irrespective of whether open cardiac operation has taken place. The results suggest that CHD may be related to psychopathology in young males in Korea. Therefore, clinicians are recommended to evaluate the psychopathological traits of patients with CHD.

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