age with an increase of 13% in males and an increase of 53% in females after exercise training. Physical signs/symptoms increased in male patients but decreased in female patients after exercise training which may explain why female patients had greater improvement in body image than male patients. Also a significant improvement in body image was found in patients who had undergone OHT over 1 year rather than patients who had undergone OHT less than 1 year. The reasons for this discrepancy could be the same as those for the gender difference.

In summary, the estimated  $VO_{2max}$ , ability in physical performance, body image, and exercise self-efficacy significantly improved after 10 weeks of exercise training. The findings of this study suggest that a well-designed cardiopulmonary rehabilitation center is needed to improve the quality of care of patients with OTH in Taiwan. However, because of the lack of a control group and small sample size in this study, generalization of these findings is limited.

## **ACKNOWLEDGMENTS**

This investigation was supported by a grant (NSC 87-2314-B-038-018) from the National Science Council, Taiwan, R.O.C.

## REFERENCES

- Barnard, C.N. A human cardiac transplant: an interim report of a successful operation at Groote Schuur Hospital, Cape Town. S. Afr. Med. J. (1967) 41, 1271-1274.
- 2. Hosenpud, J.D., Novick, R.J., Brean, T.J., Daily, O.P. The registry of the international society for heart and lung transplantation. Eleventh Official Report-1994. *J. Heart Lung Transpl.* (1994) **13**, 561-570.
- Chou, M.T., Shieh, B.J., Lee, K.M. A study on psychosocial adjustment for heart transplantation patients in Taiwan. *Acta. Cardiol. Sin.* (1994) 10, 149-154.
- Kaye, M.P. The registry of the international society for heart and lung transplantation: tenth official report-1993. *J Heart Lung Transpl.* (1993) 12, 541-548.
- 5. Degre, S.G., Niset, G.L., Desmet, J.M., Ibrahim, T.,

- Stoupel, E., Le Clerc, J.L., Primo, G. Cardiorespiratory response to early exercise testing after orthotopic cardiac transplantation. *Am. J. Cardiol.* (1987) **60**, 926-928.
- Kappagoda, C.T., Haennei, R.G., Serrano-Fiz, S., Davis, D.H., English, T.A. The hemodynamic responses to upright exercise after orthotopic cardiac transplant. *Arch. Phys. Med. Rehabil.* (1993) 7, 484-489.
- Badenhop, D.T. The therapeutic role of exercise in patients with orthotopic heart transplant. *Med. Sci. Sports Exerc.* (1995) 27, 975-985.
- Kavanagh, T., Yacoub, M.H., Mertens, D.J., Kennedy, J., Campbell, R.B., Sawter, P. Cardiorespiratory responses to exercise training after orthotopic cardiac transplantation. *Circulation* (1988) 77, 162-171.
- Keteyian, S., Shepard, R., Ehrman, J. Cardiovascular responses of heart transplant patients to exercise training. J. Appl. Physiol. (1991) 70, 2627-2631.
- Mandak, J.S., Aaronson, K.D., Mancini, D.M. Serial assessment of exercise capacity after heart transplantation.
  J. Heart Lung Transpl. (1995) 14, 468-478.
- Jones, B.M., Chang, V.P., Esmore, D., Spratt, P., Shanahan, M.X., Farnsworth, A.E., Keogh, A., Downs, K. Psychological adjustment after cardiac transplantation. *Med. J. Aust.* (1988) 149, 118-122.
- Osada, N., Chaitman, B.R., Donohue, T.J., Wolford, T.L., Stelken, A.M., Miller, L.W. Long-term cardiopulmonary exercise performance after heart transplantation. *Am. J. Cardiol.* (1997) 79, 451-456.
- 13. Zenati, M., Morelli, D., Fabbri, A., Casarotto, D. Elements for an analysis of psychosocial indicators and psychological intervention in heart transplantation. *G. Ital. Cardiol.* (1988) **18**, 479-484.
- Bunzel, B., Wollenek, G., Grundbook, A., Schramek, P. Heart transplantation and sexuality. A study of 62 male patients. *Herz*. (1994) 19, 294-302.
- 15. Bunzel, B., Schmidl-mohl, B., Grundbock, A., Wollenek, G. Does changing the heart mean changing personality? A retrospective inquiry on 47 heart transplant patients. Qual. Life Res. (1992) 1, 251-256.
- Duitsman, D.M., Cychosz, C.M. Gender differences in psychosocial characteristics of heart transplant recipients. J. Transpl. Coord. (1995) 5, 137-143.
- Duitsman, D.M., Cychosz, C.M. Psychosocial similarities and differences among employed and unemployed heart transplant recipients. J. Heart Lung Transpl. (1994)