Research Article

The Efficacy of Double-Heart Nursing in Combination with Seaweed Polysaccharide for Patients with Coronary Heart Disease Complicated with Diabetes: A Pilot, Randomized Clinical Trial

Yulei Hu,1 Yan Wang,2 Fengwei An,3 and Nini Dai4

1Department of Cardiology, Jiaozhou Central Hospital of Qingdao, Jiaozhou, China
2Department of Rheumatology, The Fifth People’s Hospital of Qingdao, Qingdao, China
3Outpatient Department, The Fifth People’s Hospital of Qingdao, Qingdao, China
4Department of Pediatrics, Qingdao Hospital of Traditional Chinese Medicine (Qingdao Hiser Hospital), Qingdao, China

Correspondence should be addressed to Nini Dai; daidiji93224@163.com

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Objective. To study and explore the effect of double-heart nursing combined with seaweed polysaccharide on improving the self-efficacy and quality of life of patients with coronary heart disease and diabetes.

Methods. Eligible 214 patients with coronary heart disease and diabetes who were diagnosed and treated in our hospital between year 2017 and 2020 were randomized at a ratio of 1 : 1 to either control group (seaweed polysaccharide) or observation group (double-heart nursing combined with seaweed polysaccharide). The self-efficacy and quality of life of the two groups of patients after treatment were compared.

Results. The observation group reported a lower blood glucose level after treatment vs. the control group [(6.28 ± 4.49/8.24 ± 2.01) vs. (7.74 ± 4.18/11.41 ± 3.12)] (p < 0.05); a lower incidence of lesions in the observation group versus the control group after treatment (p < 0.05); and significantly lower SAS and SDS scores of the observation group vs. the control group was observed [(41.27 ± 4.08/43.81 ± 2.93) vs. (62.74 ± 3.48/61.58 ± 3.83)] (p < 0.05). Regarding the self-efficacy, the observation group was superior to the control group after treatment (p < 0.05). The treatment with double-heart nursing combined with seaweed polysaccharide was associated with the improvement of the quality of life with respect to social function, psychological function, and material life (each p < 0.05). The observation obtained a significantly higher satisfaction rate in comparison with the control group [107 (98.13%) vs.95 (88.80%)] (p < 0.05).

Conclusion. Seaweed polysaccharide and double-heart nursing might be practical in improving the self-efficacy and quality of life of patients with coronary heart disease and diabetes mellitus, compared with conventional clinical treatment alone.

1. Introduction

Coronary heart disease is a common and frequently-occurring disease [1], and it is usually associated with depression and anxiety and other negative emotions, which is not well manageable and controllable [2, 3]. Diabetes is a frequently seen endocrine disease [4] and predisposes to declined immunity. Complications such as diabetic retinopathy, vascular disease, and neuropathy may occur if blood sugar is not favorably controlled. Also, diabetes is a major contributing factor for coronary heart disease. The diabetes combined with coronary heart disease reports more difficulty to control and the dangerousness vs. coronary heart disease alone [5]. In recent years, the morbidity and mortality of coronary heart disease have witnessed a rising trend. As a chronic disease, although the radical cure for coronary heart disease remains unknown, a number of risk factors such as external stimuli have been identified, leading to alternative nursing taken into consideration. Double-heart nursing, a mode adapting to cardiovascular diseases, pays attention to the patient’s psychological health, respects the patient’s subjective feeling while treating the physical illness, which has been widely applied clinically and achieved remarkable results [6]. Seaweed polysaccharide, a multicomponent...
mixture [7], has an immunoregulatory role in the physiological function of the human body.

Some studies reported its use as an additive ingredient in food for diabetics. Seaweed polysaccharide has many biological activities, and one of its component of low molecular weight fucoidan sulfate (LMSF) is an inherent intercellular water-soluble polysaccharide in brown algae, mainly composed of fucose and organic sulfate, contains galactose, xylose, and a small amount of uronic acid. The experiments conducted by the Qingdao Ocean University demonstrated that LMSF can directly scavenge peroxyanion free radicals and hydroxyl free radicals in vitro and also significantly enhance the SOD binding capacity in serum and tissues in vivo. Accordingly, it can serve as a potential drug in lowering blood lipids and preventing atherosclerosis [8, 9]. The present study was designed to explore the treatment effectiveness of double-heart nursing in combination with seaweed polysaccharide on coronary heart disease complicated with diabetes.

### 2. Study Design

#### 2.1. Participants. Eligible 214 patients with coronary heart disease and diabetes who were diagnosed and treated in our hospital between year 2017 and 2020 were randomized at a ratio of 1:1 to either control group or observation group. In the control group, there were 49 males and 58 females, with an age of 42-81 years and 40-72 years, respectively; in the observation group, there were 55 males and 52 females with an age of 45-76 years and 41-79 years, respectively. It should be noted that there were no significant differences between the two groups regarding the baseline values in the different domains (p > 0.05) (See Table 1).

#### 2.2. Inclusion and Exclusion Criteria. Inclusion criteria are as follows: in compliance with diagnostic criteria for diabetes and coronary heart disease, patients were informed of the study and voluntarily signed the consent form; this study has been approved by the ethics committee of our hospital.

Exclusion criteria are as follows: allergies to the drugs used in the study; patients with congenital heart disease or psychiatric diseases; and patients who did not complete the treatment due to transfer midway or other reasons.

#### 2.3. Interventions. The patients in the control group were given routine symptomatic nursing, including blood glucose measurement, basic nursing, vital signs monitoring, and medication following doctor’s orders.

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### Table 1: Comparison of general data between the two groups ($\bar{x} \pm s$).

| Groups          | n  | Gender | Age (year)   | Course of disease (year) | Blood sugar level |
|-----------------|----|--------|--------------|--------------------------|------------------|
| Control group   | 107| 49/58  | 55.01 ± 8.73/54.33 ± 7.95 | 5.62 ± 4.03        | 11.65 ± 3.34     |
| Observation group | 107| 55/52  | 56.14 ± 6.88/55.72 ± 8.17   | 5.18 ± 4.67        | 11.48 ± 3.72     |

#### Table 2: Comparison of blood glucose levels in the two groups after treatment ($\bar{x} \pm s$, point).

| Groups          | n  | FBG   | 2hBG         |
|-----------------|----|-------|--------------|
| Control group   | 107| 7.74 ± 4.18 | 11.41 ± 3.12 |
| Observation group | 107| 6.28 ± 4.49 | 8.24 ± 2.01  |

#### 2.4. Outcomes. 200 ml of blood was drawn intravenously in the fasting state and two hours after meals, and the changes of blood glucose were compared between the two groups.

The patients in the observation group were given double-heart nursing combined with seaweed polysaccharide for treatment. Upon admission, routine examination and diagnosis were performed, and then, seaweed polysaccharide was orally administrated.

Double-heart nursing: first of all, emotional counseling nursing should be implemented for patients. Nurses should strengthen active communication with patients, carry out peer education, encourage patients, and guide patients to carry out psychological adjustment. In addition, nurses should inform the family members of patients of the value of social support nursing in detail and guide the family members to accompany and care for patients as much as possible, so as to reduce their psychological burden. Secondly, nurses give health knowledge guidance to patients, inform patients of the pathogenic factors and treatment methods of the disease, and put forward reasonable prognostic suggestions and assist patients in making diet and exercise plans and explain the use methods and precautions of drugs. Nurses help patients strengthen self-management and improve their self-management ability, so as to form good eating habits, medication habits, and exercise habits and fundamentally enhance patients’ treatment compliance.

The adverse lesions including hyperlipidemia, microvascular disease, and eye disease were compared, which diagnoses through laboratory examination and fundus examination.

The self-rating anxiety scale (SAS) and the self-rating depression scale (SDS) were applied to assess and compare the psychological state of the two groups of patients; the score of 55 or below represents normal, the score of 56-65 represents mild anxiety or depression, the score of 66-75 represents moderate anxiety or depression, and the score
of 76 or above represents severe anxiety or depression; and lower scores indicate better psychological state.

The purpose-built disease management ability questionnaire was employed to assess self-efficacy of the two groups, with 10-15 suggesting the average disease management ability and 15-20 suggesting the good disease management ability; the higher the score, the better the patient’s self-efficacy and disease management ability. WHO Quality of Life-Abbreviated Version was simplified according to WHO QOL-100 and consists of 26 items in four fields: physical health, psychological function, social relations, and material environment. It mainly evaluates the individual’s quality of life. The higher the score, the better the quality of life. Cronbach’s of each dimension is $\alpha$. The coefficients are $>0.70$.

The satisfaction questionnaire developed by our hospital (including medical staff attitude, medical staff efficiency, and medical staff disease explanation) was used to assess the satisfaction and rated as very satisfied, satisfied, not very satisfied, and dissatisfied.

The above indicators were collected at admission and discharge.

2.5. Statistical Analysis. GraphPad Prism 8 software and SPSS 22.0 software were employed for graphics plotting and data analysis. Enumeration data [$n$ (%)] and measurement data ($x \pm s$) were verified via $\chi^2$ tests and $t$-tests, respectively. The level of significance was set at $p \leq 0.05$.

3. Results

3.1. Blood Sugar Levels. The observation group reported a lower blood glucose level after treatment vs. the control group [(6.28 $\pm$ 4.49/8.24 $\pm$ 2.01) vs. (7.74 $\pm$ 4.18/11.41 $\pm$ 3.12)] ($p < 0.05$), indicating that double-heart nursing combined with seaweed polysaccharide plays a favorable sugar-lowering function in coronary heart disease and diabetes mellitus, as shown in Table 2.

3.2. Incidence of Lesions. The chi-square test revealed a lower incidence of lesions in the observation group versus the control group after treatment, suggesting that double-heart nursing combined with seaweed polysaccharide in the treatment of coronary heart disease complicated with diabetes leads to a high safety profile ($p < 0.05$, Table 3).

3.3. Mental State. Significantly lower SAS and SDS scores of the observation group vs. the control group were observed ($3.2 \pm 0.70$ vs. $4.1 \pm 1.05; p < 0.05$).

3.4. Self-Efficacy. Regarding the self-efficacy, the observation group was superior to the control group after treatment ($p < 0.05$, Table 4).

3.5. Quality of Life. The $t$-test results showed that treatment with double-heart nursing combined with seaweed polysaccharide was associated with the improvement of the quality of life with respect to social function, psychological function, and material life (each $p < 0.05$, Table 5).

3.6. Patient Satisfaction. The results showed that 39 (36.45%) patients in the control group were very satisfied, 56 (52.35%) satisfied, 10 (9.35%) not very satisfied, and 2 (1.85%) dissatisfied; in the observation group, 46 (42.99%) were very satisfied, 59 (55.14%) satisfied, 2 (1.87%) not very satisfied, and 0 (0.00%) dissatisfied. The observation obtained a significantly higher satisfaction rate in comparison with the control group [107 (98.13%) vs. 95 (88.80%)] ($p < 0.05$).
heart disease [13, 14]. Additionally, issues such as poor com-
sidered more dangerous and risky than ordinary coronary
and coronary heart disease combined with diabetes is con-
iety [11]. Diabetes is a trigger of coronary heart disease [12],
ease to recur, and complications of depression and anx-
radical treatment due to its long course, chronic property
disease continue to rise [10]. However, there remains no
Nowadays, the morbidity and mortality of coronary heart
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radical treatment due to its long course, chronic property
and coronary heart disease combined with diabetes is con-
considered more dangerous and risky than ordinary coronary
heart disease [13, 14]. Additionally, issues such as poor com-
pliance and insufficient disease knowledge also exist in some
patients [15], thereby necessitating an effective alternative.
Dual-heart nursing concentrates on patient’s psychological
and mental health and subjective feelings and is considered
a scientific therapy [16, 17]. Seaweed polysaccharide is a
multicomponent mixture and has proven to have a good
effect on the treatment of diabetes[18] [19, 20]. According
to our results, the observation group outperformed the con-
troul group in terms of blood glucose level and the incidence
of lesion, probably because sargassum confusum oligosac-
charides (SCOs) in seaweed polysaccharides could signifi-
cantly lower fasting blood glucose levels, protect the
structure of liver cells, and increase the abundance of Bacil-
lus and Clostridium XIVa, reduce the abundance of Bacter-
oides, Allobaculum, and Clostridium IV and play an
antidiabetic role through the JNK-IRS1/PI3K signaling path-
way [19, 20]. Moreover, our results showed that SAS and
SDS scores in the observation group were lower than those
of the control group, and the healthy mentality is presum-
ably attributed to that the double-heart nursing was given
from the humanistic care while the seaweed polysaccharide
was administered. Also, the present study reported a better
self-efficacy in the observation group versus the control
group. Assumedly, the medical staffs’ explanation about
the disease knowledge, communication with the patient’s
family in dual-heart nursing, allows the patient to recognize
their symptoms and to manage their emotions, thereby
benefiting medication compliance. More importantly, we
observed a better quality of life in the observation group,
which might be contributed to the administration of sea-
wed polysaccharide stimulated differentiation and matura-
tion and reproduction of various immune active cells (such
as macrophages, T lymphocytes, and B lymphocytes), so that
the patient’s immune system can be restored and strength-
ened and further their body function. Double-heart nursing
requires the patient to be followed up by the nursing staff
after discharge and pays attention to the patient’s physical
changes and adjusts, which contributes a lot to maintaining
good living habits, social function, psychological function,
and material life. Notably, treatment with seaweed polysac-
charide and double-heart nursing yielded a higher satisfac-
tion in the present study. Consistently, the research
conducted by the Yantai Laiyang Central Hospital obtained
similar conclusions.

As previously noted, seaweed polysaccharide and
double-heart nursing might be practical in improving the
self-efficacy and quality of life of patients with coronary
heart disease and diabetes mellitus, compared with conven-
tional clinical treatment alone, and it is worthy of wide
application and promotion.

Table 4: Comparison of disease management ability between the two groups after treatment (x ± s, point).

| Groups           | n  | Symptom perception | Disease management | Emotional management | Medication  |
|------------------|----|--------------------|--------------------|---------------------|------------|
| Control group    | 107| 12.74 ± 3.01       | 13.71 ± 2.65       | 12.05 ± 1.58        | 15.12 ± 2.14 |
| Observation group| 107| 18.21 ± 1.35       | 17.87 ± 2.32       | 17.85 ± 2.65        | 18.59 ± 1.57 |
| t                |    | —                  | 17.152             | 12.218              | 19.446     |
| p                |    | <0.001             | <0.001             | <0.001              | <0.001     |

Table 5: Comparison of quality of life between the two groups after treatment (x ± s, point).

| Groups           | n  | Body function | Social function | Mental function | Material life  |
|------------------|----|---------------|-----------------|----------------|--------------|
| Control group    | 107| 68.95 ± 2.98  | 65.85 ± 4.15    | 64.12 ± 3.58   | 67.88 ± 2.74 |
| Observation group| 107| 81.24 ± 3.84  | 84.15 ± 4.09    | 83.28 ± 4.65   | 84.65 ± 3.27 |
| t                |    | 26.115        | 32.488          | 33.772          | 40.661       |
| p                |    | <0.001        | <0.001          | <0.001          | <0.001       |

4. Discussion

Nowadays, the morbidity and mortality of coronary heart
disease continue to rise [10]. However, there remains no
radical treatment due to its long course, chronic property
and ease to recur, and complications of depression and anx-

Table: Comparison of quality of life between the two groups after treatment (x ± s, point).
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