

The effect of Ginseng on the sexual dysfunction in patients with diabetes

Abstract

Aims : Considering the important role of sexual dysfunction and decreased sexual function of patients with diabetes, the purpose of this study was to investigate the effect of soft gelatin capsules of ginseng as an herbal medicine on sexual function in patients with diabetics.

Methods: In this double-blind controlled clinical trial with a control group, 80 patients with diabetes (type 1 and 2) were selected using convenience sampling method, and randomly were allocated to two groups of control and intervention groups (each 40 person). The effect of 100 to 200 mg of ginseng soft gelatin capsules (daily for 8 weeks) on the sexual function of men and women with diabetes in the intervention group and a similar placebo in the control group were studied. The Female Sexual Function Index (FSFI) and the International Index of Erectile Function (IIEF) were used for gathering data in before and the end of 8 weeks intervention. Data were analyzed using SPSS 16 software.

Findings: In the beginning of the study, the mean score of the IIEF index in the control and intervention groups were 28.08 ± 5.93 and 30.73 ± 8.15 , respectively without significant change ($P=0.199$). Eight weeks after intervention, the IIEF index significantly improved in the group receiving Ginseng 44.95 ± 7.64 as compared to the control group 27.81 ± 6.02 ($P<0.001$). At the base line, the mean score of FSFI index in the control and intervention groups were 47.36 ± 5.93 and 46.06 ± 5.47 , respectively ($P= 0.525$). At the end of study, the FSFI index significantly improved in the group receiving Ginseng 66.17 ± 5.63 as compared to the control group 47.21 ± 8.41 ($P<0.001$).

Conclusion: The consumption of Ginseng for 8 weeks had a significant effect on the improvement in the sexual function of male and female diabetic patients. However, it is recommended to the patients with diabetes, if the results will be confirmed in the similar studies.

Keywords: Ginseng; Sexual function; Diabetes

Introduction

Diabetes is the endocrine disease in the world and led to about 4 million deaths per year [1]. It is stated the global prevalence of diabetes is about 552 million people by 2030 [2]. Also, it is estimated that the annual growth rate of diabetes in Iran will reach the second place in the region after Pakistan by 2030 [3]. Diabetes is chronic diseases that affect different organs and systems of the body [4]. Diabetes can lead to a variety of sexual disorders and complications that affect both men and women. In men, diabetes is a significant risk factor for erectile dysfunction (ED), which is characterized by the inability to achieve or maintain an erection sufficient for sexual intercourse. ED is one of the common complications of diabetes, the prevalence of which is approximately 3.5 times higher in men with diabetes than in men without diabetes. The development of ED in men with diabetes is often related to the severity and duration of diabetes, as well as the presence of comorbidities such as hypogonadism, metabolic syndrome, obstructive sleep apnea, and depression [5]. Diabetes in women can also cause significant sexual dysfunction. Studies have shown that women with type 1 diabetes have more sexual dysfunction compared to their age-matched counterparts. The prevalence of female sexual dysfunction (FSD) in women with type 2 diabetes is even higher, with a study in Iran reporting that 78.7% of women with type 2 diabetes have experienced some form of sexual dysfunction. Common sexual problems in women with diabetes include loss of orgasm disorder, libido, pain, and arousal disorder during intercourse [6, 7].

Herbal medicines are an important natural resource for drug development. Various pathological conditions can be treated with medicines derived from plants. A number of modern medicines originate from traditional medicines [8]. Several studies show that ginseng attenuates cardiovascular diseases [9], inflammatory bowel disease [10], Alzheimer's disease [11], and type 2 diabetes mellitus [12-15]. Ginseng is a complex substance including bioactive and potentially effective therapeutic compounds [16,17]. Ginsenoside is the main component of ginseng that has anti-cancer effects [18]. In recent years, the use of herbal medicines in the treatment of erectile dysfunction has also attracted much attention. Several studies have reported the positive effects of onion in improving sexual performance. The use of onion as an aphrodisiac food to increase sexual desire

and strengthen the reproductive organs has been emphasized a lot in traditional medicine [9]. Among the herbal medicines used in male sexual dysfunction are Ginkgo Biloba, Red Ginseng, and pollen (used in traditional Chinese medicine with the scientific name: Epimedium). Ginseng was marketed as a supplement capable of increasing potency, and sexual activity [10].

Ginseng has shown promising sexual benefits, especially in postmenopausal women and men with erectile dysfunction, as it contains ginsenoside compounds that enhance sexual performance by increasing the release of neurotransmitters. In postmenopausal women, ginseng significantly improved sexual function, quality of life, and reduced menopausal symptoms in a randomized controlled trial. [11]. In men with erectile dysfunction, ginseng supplementation led to significant improvements in erectile function and overall satisfaction in various studies. These effects are believed to be due to ginseng's ability to increase nitric oxide production and modulate neural pathways involved in sexual function. While ginseng is generally safe, it can interact with medications and may cause mild side effects, emphasizing the importance of consulting a healthcare professional before use, [12]. In the study by Andrade De et al. (2007), the results indicated therapeutic effectiveness of ginseng in men with erectile dysfunction [23].

Ginseng has a long history of use in traditional medicine for various health benefits, including its purported aphrodisiac effects. However, its effectiveness in diabetic patients has not yet been investigated. Therefore, the aim of this study was to investigate the effect of soft gelatin capsules of ginseng on sexual desire in patients with diabetes.

Methods

Design

This Double-blind clinical trial research was conducted in Yasuj University of Medical Sciences with IRCT20231129060218N2 from the Iranian Registry of Clinical Trials, on 80 patients with diabetes (type 1 and 2) referring to Shahid Mufteh Medical Clinic in Yasuj, Iran. It was done in 2024-02 until 2024-10

Sampling and participants

Based on study (Chung H.S et al., 2015 [24], ginseng can increase the libido index in diabetic patients in the range of 3-10 and with a variance of 16, so the sample size, considering a type I error of 5%, a test power of 80%, the estimated variance of changes in libido in the intervention and control groups was 25 and 16, respectively. Taking into account the drop in the sample size, 40 patients were obtained in each group.

Inclusion criteria included heterosexual men and women aged 30 to 55 years with diabetes, at least 3 years had passed since diagnosis, were sexually active for at least 6 months, were sexually active during the 8 weeks of the study, and sexual dysfunction was confirmed by the relevant questionnaire. Exclusion criteria included non-cooperation in the treatment process, incomplete questionnaire and patient records, and intolerance or allergic reaction to ginseng.

Eighty patients with diabetes (type 1 and 2) were selected based on convenience sampling method, and randomized in two groups (40 patients in each group) including intervention group (ginseng recipients) and control group (placebo recipients) using sealed envelopes

Intervention

Intervention group: In this study, the effect of 100-200 mg of ginseng capsules on the sexual performance of men and women with diabetes was investigated. Each ginseng capsule contained 100 mg of dry ginseng extract (provided by Dana company in Iran), and patients in the intervention group consumed one capsule (equivalent to 100 mg) daily in the first week. Then, if the samples tolerated the amount of 100 mg, they received two capsules (equivalent to 200 mg) daily. The intervention was continued during 8 weeks.

Control group: The placebo capsules looked exactly the same as the ginseng capsules.

The capsules were placed in exactly the same bottles with codes A and B. The selection of samples was done in a continuous manner and the samples were randomly divided into 2 intervention and control groups using sealed envelopes.

Blinding: The researcher and the patient remained unaware of their group until the end of the study.

Instrument and sampling

A blood sample was taken from the patients to test HBA1C, testosterone, prolactin, LDL, HDL before giving the drug. The tests were performed using the calorimetric method and a Hitachi device. The International Erectile Function Scale (IIEF) and the Female Sexual Function Index (FSFI) were used to evaluate the effectiveness of the intervention (ginseng) in the men, and women, respectively.

International Erectile Function Scale (IIEF): International Erectile Function Scale is standard scale that was made by Rosen et al. (2000) [23]. It has 15 questions and measures 5 subscales of sexual function including sexual desire (cases 11, 12, and score 1-10), orgasmic function (cases 9-10, and score 0-10), intercourse satisfaction (cases 6-8 q, and score 0-15), erectile function (cases 1, 2,3,4,5, 15, and score 1-30) and overall satisfaction (cases 13,14, and score 0-15). A 5-point Likert scale (1-5) was used to score the questions. A score of five was for normal functioning. A higher score indicated better sexual functioning, and the maximum acceptable score was 75, that indicating the best sexual condition. In Iranian version, the content validity index and ratio values were more than 0.78 and 0.90 respectively, and Cronbach's coefficient was 0.80 for all dimensions [21].

Female Sexual Function Scale (FSFI): This scale was made by Rosen et al [21]. It measures women's sexual function in 6 subscales, including desire (2 questions), arousal (4 questions), lubrication (4 questions), orgasm (3 questions), pain (3 questions), and sexual satisfaction (3 questions), with 19 questions. A higher score indicated better sexual functioning [21]. The scores for each question range from 0 to 5, with a score of 0 being considered as non-sexual activity, and a score of 5 being equivalent to better performance in that area (except for the first and second questions, which are given scores of 1-5). Total scale scores are obtained by adding the six domain scores. The minimum score is 2 and the maximum score is 36. The Persian version of this instrument was made by Mohammadi et al. (2008). The reliability and validity of the scale were confirmed. Cronbach's coefficient was 0.70 for all dimensions [21].

Outcome

In the present study, the outcomes of the study were sexual function of the participants including men and women. Moreover, in the men, the subscales of sexual desire, orgasmic function, intercourse satisfaction, erectile function, and overall satisfaction assessed. Also, in the women, the subscales of desire, arousal, lubrication, orgasm, pain, and sexual satisfaction were measured. The outcomes measured in before, and after intervention (week 0, week 8).

Statistical analysis

The effectiveness analysis was based on changes in questionnaire response scores from the beginning of treatment to the end of 8 weeks. The Kolmogorov-Smirnov test was used to investigate normal distribution. A p value of less than 0.05 was used for statistical significance. Statistical analysis was performed by SPSS statistical package 16 (SPSS Inc., Chicago, IL, USA). Finally, statistical data analysis was done by Mann-Whitney, independent t test, chi-square, Wilcoxon and paired t-test.

Results

80 patients with diabetes were participated and remained until end of the study.

Demographic characteristics of patients

The mean (standard deviation) age of the patients participating in the control group and the intervention group was 42.15 (7.94) years and 42.63 (5.78) years, respectively, which had no significant difference (P=0.780). In the control group, 65% and in the intervention group, 55% of the participants were men (P=0.361) (Table 1).

Table 1 The demographic characteristics of diabetic patients in the control group and the group receiving ginseng

<i>Variables</i>	Intervention group N = 40	Control group N = 40	<i>P Value</i>
Age (years)	42.63 ± 5.78	42.15 ± 7.94	*0.780

Gender (in percent)	Man (55%)	Man (65%)	#0.361
	Female (45%)	Female (35%)	

Mann-Whitney test, #independent t-test

Comparison of laboratory findings

Since the level of hormones is effective in sexual function, it was necessary to prove the correct function of sex hormones and their normality for these patients, which in this study the levels of HbA1C, HDL, testosterone and prolactin were compared between the two groups before the intervention. According to the findings, there was no significant difference between the levels of HbA1C (P=0.150), HDL (P=0.809), testosterone (P=0.051) and prolactin (P=0.470) between the control and intervention groups before the intervention (Table 2).

Table 2. Comparison of laboratory findings of diabetic patients in the control group and the group receiving ginseng in the baseline

<i>Variables</i>	Intervention group N = 40	Control group N = 40	* P Value
HbA1C (%)	7.5 ± 0.39	7.62 ± 0.40	0.150
HDL (mg/dl)	49.78 ± 10.84	50.30 ± 10.69	0.809
Testosterone (ng/ml)	3.17 ± 1.30	2.5 ± 1.91	0.051
Prolactin (ng/ml)	0.84 ± 0.61	0.71 ± 0.48	0.470

*Mann-Whitney test

Comparison of men's sexual performance before and after the intervention between the control group and the group receiving ginseng

To evaluate the effectiveness of the intervention, the International Erectile Function Scale (IIEF) for men was used. According to the obtained results, the mean (standard deviation) of the international scale of erectile function (IIEF) before the intervention in the control group and the group receiving ginseng was 28.08 ± 5.93 and 30.73 ± 8.15, respectively. There was no significant difference (P=0.199) (Table 3).

The mean (standard deviation) of the International Erectile Function Scale (IIEF) after the intervention in the control group and the group receiving ginseng was 27.81 ± 6.02 and 44.95 ± 7.64, respectively, which in the group receiving ginseng, it was significantly higher than control group (P<0.001) (Table 3). It was also shown that all aspects of orgasmic function, sexual desire, erectile function, sexual satisfaction, and overall individual satisfaction in men improved significantly after the intervention compared to the control group (P<0.05) (Table 3).

Table 3 Comparison of men's sexual function before the intervention in the control group and the group receiving ginseng

Variables	Time	Intervention group	Control group	P Value
Erectile function	Before	11.05 ± 4.58	8.58 ± 4.48	*0.078
	After	16.00 ± 6.78	8.04 ± 3.88	*0.001

sexual desire	Before	3.45 ± 2.15	4.27 ± 1.76	*0.104
	after	5.52 ± 2.57	4.42 ± 1.81	*0.040
Orgasmic function	Before	4.41 ± 2.54	3.81 ± 2.14	*0.385
	after	5.91 ± 2.64	3.96 ± 2.20	*0.015
intercourse Satisfaction	Before	7.09 ± 3.77	7.00 ± 3.20	*0.730
	After	10.68 ± 2.06	6.92 ± 2.84	*0.001
Overall satisfaction	Before	4.73 ± 2.07	4.42 ± 2.42	*0.683
	After	6.55 ± 2.99	4.46 ± 2.37	*0.012
total score	Before	30.73 ± 8.15	28.08 ± 5.93	*0.199
	After	44.95 ± 7.64	27.81 ± 6.02	*<0.001

Mann-Whitney test #independent t-test

Examining the changes in sexual performance of men within and between groups

Paired t-test and Wilcoxon test were used to investigate the effect of ginseng on men's sexual performance and intra-group comparison. The results showed that in the control group, the changes made in none of the dimensions before and after the intervention were not significant ($P < 0.05$). Nevertheless, the results showed that in the group receiving ginseng, except for the orgasmic performance, all other dimensions of sexual performance in men had a significant increase compared to before the intervention ($P < 0.05$). Finally, the results showed a significant effect of ginseng consumption on changes in sexual performance over time compared to the control group ($P < 0.001$) (Table 4).

Table 4: Examining changes in male sexual performance within groups

Variables	Gensing group			P value	Control group			P value
	Before the intervention	After the intervention			Before the intervention	After the intervention		
	Mean ± standard deviation	Mean ± standard deviation			Mean ± standard deviation	Mean ± standard deviation		
Erectile function	11.05 ± 4.58	16.00 ± 6.78	*0.017	8.58 ± 4.48	8.04 ± 3.88		*0.170	
sexual desire	3.45 ± 2.15	5.52 ± 2.57	*0.005	4.27 ± 1.76	4.42 ± 1.81		*0.102	
Orgasmic performance	4.41 ± 2.54	5.91 ± 2.64	*0.101	3.81 ± 2.14	3.96 ± 2.20		*0.102	
intercourse Satisfaction	7.09 ± 3.77	10.68 ± 2.06	*0.001	7.00 ± 3.20	6.92 ± 2.84		*0.233	

Overall satisfaction	4.73 ± 2.07	6.55 ± 2.99	*0.010	4.42 ± 2.42	4.46 ± 2.37	*0.317
total score	30.73 ± 815	44.95 ± 7.64	^0.001	28.08 ± 5.93	27.81 ± 6.02	^0.721

*Wilcoxon test ^ paired t test

Examining the changes in sexual performance of women within and between groups

To evaluate the impact of the intervention, the Women's Sexual Function Index (FSFI) was used for women. According to the obtained results, the mean (standard deviation) of women's sexual function index (FSFI) before the intervention in the control group and the group receiving ginseng was 47.36±5.93 and 46.06±5.47, respectively, which there was no significant difference (P=0.525) (Table 5).

The mean (standard deviation) of women's sexual function index (FSFI) after the intervention in the control group and the group receiving ginseng was 21.47 (8.41) and 17.66 (5.63), respectively, which in the receiving group Ginseng was significantly higher (P<0.001) (Table 7-4). It was also shown that all aspects of sexual desire, psychological stimulation, moisture, orgasm, satisfaction, and sexual pain in women improved significantly after the intervention compared to the control group (P<0.05) (Table 5).

Table 5 Comparison of women's sexual performance before and after the intervention between the control group and the group receiving ginseng

Variables	Time	Intervention group	Control group	p Value
Sexual desire	Before	5.44±1.15	5.29±1.20	*0.694
	after	6.61± 0.98	4.07± 1.54	*0.001
Arousal	Before	8.94± 3.10	10.93± 3.32	#0.087
	after	15.06± 3.40	12.00± 2.66	#0.010
lubrication	Before	8.78± 3.28	8.71± 2.95	#0.955
	after	10.94± 2.13	8.21± 2.72	*0.002
Orgasm	Before	9.72± 2.35	9.07± 2.29	#0.492
	after	11.61± 1.69	8.57± 2.85	#0.001
Satisfaction	Before	6.72± 3.18	6.5± 3.70	*0.613
	after	11.22± 2.80	7.79± 3.62	#0.005
Sexual pain	Before	6.44± 2.98	6.86± 2.57	*0.587
	after	10.72± 1.90	6.57± 3.01	*0.001
Total score	Before	46.06± 5.47	47.36± 5.93	#0.525
	after	66.17± 5.63	47.21± 8.41	#0.001

^Mann-Whitney test #independent t-test

Examining the changes in sexual performance of women within groups

Paired t-test and Wilcoxon were used to investigate the effect of ginseng on women's sexual performance and intra-group comparison. The results showed that in the control group, the changes made in none of the dimensions before and after the intervention were not significant (P<0.05). Nevertheless, the results showed that in the group receiving ginseng, all dimensions of sexual performance in women significantly increased compared to before the intervention (P<0.05). Finally, the results showed a significant effect of ginseng consumption on changes in women's sexual performance over time compared to the control group (P<0.001) (Table 6).

Table 6 Examination of changes in sexual performance of women within groups

Variables	Gensing group			Control group			P value
	Before intervention	After intervention	P value	Before intervention	After intervention	P value	
	Mean \pm standard deviation	Mean \pm standard deviation		Mean \pm standard deviation	Mean \pm standard deviation		
sexual desire	5.44 \pm 1.15	6.61 \pm 0.98	*0.002	5.29 \pm 1.20	4.07 \pm 1.54	*0.043	
Arousal	8.94 \pm 3.10	15.06 \pm 3.40	*<0.001	4.27 \pm 1.76	12.00 \pm 2.66	^0.257	
lubrication	8.781 \pm 3.28	10.94 \pm 2.13	*0.038	8.71 \pm 2.95	8.21 \pm 2.72	*0.801	
orgasm	9.72 \pm 2.35	11.61 \pm 1.69	^0.009	9.07 \pm 2.29	8.57 \pm 2.85	*0.666	
satisfaction	6.72 \pm 3.18	11.22 \pm 2.80	*<0.001	6.50 \pm 3.70	7.79 \pm 3.62	*0.134	
sexual pain	6.44 \pm 2.98	10.72 \pm 1.90	*<0.001	6.86 \pm 2.57	6.57 \pm 3.01	*0.806	
total score	46.06 \pm 5.47	66.17 \pm 5.63	^<0.001	47.36 \pm 5.93	47.21 \pm 8.041	^0.953	

*Wilcoxon test ^ paired t test

Discussion

The aim of this study was to investigate the effect of soft gelatin capsules of Ginseng on sexual desire in patients with diabetes. Some studies investigated the effects of ginseng on indexes of diabetes mellitus and other metabolites. Naseri et al., in the systematic review and meta-analysis on prediabetes patients with type 2 diabetes mellitus, indicated that Ginseng supplementation improved HR and TNF- α levels, HOMA-IR, TC and LDL-C significantly [12]. Moreover, in two studies on patients with type 2 diabetes, the results revealed that red ginseng extract improved high-density lipoprotein cholesterol (HDL-C), the levels of total cholesterol, fasting insulin (FINS), and serum glucose (GLU), significantly [13-15]. Also, in the study by Liu et al., metabolomics analysis recognized 101 potential biomarkers among which 94 metabolites that had improvement [14].

Ginseng, a popular herbal medicine with adaptogenic and aphrodisiac properties, has been studied for its potential effects on sexual function. While some research shows the positive effect of ginseng on libido and sexual performance, its effectiveness in diabetic patients has not yet been investigated. The results of present study showed that Ginseng improved sexual function of men

and its subscales including sexual desire, orgasmic function, intercourse satisfaction, erectile function, and overall satisfaction. Also, in the women, the sexual function and subscales of desire, arousal, lubrication, orgasm, pain, and sexual satisfaction were improved. The mechanism of action of ginseng herbal medicine on sexual performance involves a complex interaction of various physiological processes. Ginseng, especially *Panax ginseng*, has been widely studied for its potential therapeutic effects on sexual dysfunction, including erectile dysfunction. Existing research showed that ginseng may have a positive effect on erectile dysfunction through various mechanisms; ginsenosides, the medicinally active components of ginseng, act as inducers of NO synthesis in endothelial cells and surrounding nerves. This release of NO relaxes the smooth muscles and allows more blood to enter the cavernous bodies of the penis known as the corpus cavernosum, thus facilitating erection [17, 18, 19].

Fernia et al. (2020) revealed in a study that ginseng treatment recovers the sexual side effects of methadone maintenance treatment. Moreover, sexual function improved significantly over time in the ginseng group compared to the placebo group [33]. Compared to our study, both studies showed significant improvement in sexual performance with ginseng treatment compared to placebo, and both included male and female participants. Unlike our study, Fernia et al. studied on patients with OUD (opoid use disorder), while our study targeted diabetic patients. The duration of Fernia et al.'s study was four weeks, while our study was eight weeks. Fernia et al. included a smaller sample size (74 vs. 80). Consistent findings between these two studies show that ginseng has a wide range of uses in the treatment of sexual dysfunction in a variety of conditions. The longer duration and specific focus of our study on diabetes will add valuable insights and demonstrate the efficacy of ginseng over a longer period and in different patient populations.

In the present study, sexual function in women improved after intervention. In a meta-analysis study, Ghorbani et al. (2018) investigated the effectiveness of *Panax Ginseng* on the sexual function of postmenopausal women. In this meta-analysis, they compared ginseng with placebo, which included 531 women. Ginseng did not show a statistically remarked impact on female sexual dysfunction in comparison to placebo [34]. Both studies evaluated the effect of ginseng on women's sexual performance using standard questionnaires. Both included placebo-controlled designs. Ghorbani et al. conducted a study on postmenopausal women, while our study focused on diabetic patients. In Ghorbani et al.'s study, ginseng did not show a statistically significant effect on women's sexual dysfunction compared to placebo, while in our study, ginseng consumption has a beneficial effect on women's sexual performance. Maybe, this difference was due to hormonal and pathological change in postmenopausal women or difference in sample size. In another study, Chung et al. investigated the effect of Korean red ginseng on female sexual performance in a placebo-controlled clinical trial. Forty-one premenopausal women participated in this study by administering three ginseng capsules (1 g per capsule) or placebo daily. The findings of this group showed that total FSFI scores insignificantly increased after Korean red ginseng (KRG) treatment and placebo treatment. KRG treatment significantly improved arousal, libido, overall satisfaction, and orgasm. However, there was no treatment effect compared to placebo. Finally, they concluded that oral administration of KRG extract enhanced sexual performance in premenopausal women. However, there was no statistically significant change in comparison to placebo [24]. This study, like our study, used the standard FSFI questionnaire, and like our study, it was a double-blind clinical trial. Unlike this group, our findings showed that ginseng can significantly improve the sexual function of women, this difference can be attributed to the difference in the studied population, our study focused on diabetic people, while the other findings was performed on premenopausal women.

In the present study, sexual function in men improved after intervention. In Andrade De et al. (2007), the International Index of Erectile Function score after treatment was markedly higher in the ginseng group in comparison to before treatment. In the ginseng group, 66.6% reported improvement in erection. Research data show that ginseng can be an effective alternative to invasive methods for the treatment of erectile dysfunction in men [35]. Compared to our study, both studies included placebo-controlled designs and showed significant improvement in sexual function. However, De Andrade et al. included a smaller sample size (60 vs. 80) as compared to our study. However, in above study, only erectile dysfunction investigated while in the present study, sexual dysfunction and others subscales were studied.

One of the limitations of the present study was the small number of the patients. According to the results of the present study, the consumption of Ginseng recommended for the diabetes patients with sexual dysfunction, if the results will be confirmed in the similar studies.

Conclusion

The results of this study show for the first time that ginseng intervention led to a significant improvement in sexual function in male and female diabetic patients. Overall, the results of this study support the potential benefits of ginseng herbal medicine in increasing sexual performance in diabetic patients. The adaptogenic and aphrodisiac properties of ginseng, along with its bioactive compounds such as ginsenosides, may play a key role in exerting these positive effects on sexual health. It is also recommended that in future studies, the components of ginseng be identified and the effects of the components be examined separately.

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