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Associated factors of sexual dysfunction among postpartum women in Taiwan- a cross-sectional study

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Abstract

Sexual function among postpartum women is often overlooked by health-care professionals. This study aimed to investigate associated factors of sexual dysfunction among postpartum women. This study used a cross-sectional study design. A total of 135 postpartum women from a teaching hospital in northern Taiwan who met the inclusion criteria were recruited. SPSS version 22.0 was used to analyze data including descriptive and bivariate analysis. A multiple linear regression was using to identify the predictors of sexual dysfunction among Taiwanese postpartum women. Results indicated that the categories of sexual dysfunction that most commonly experienced in postpartum women were lack of sexual desire, delay or absence of orgasm, pain during intercourse, and inability to become physically aroused. Parity, types of delivery, perineal laceration, breastfeeding, postpartum fatigue, and postpartum depression were significantly associated with sexual dysfunction ($p < .05$). Sexual counseling and mental support should be necessary for women at risk of postpartum sexual problems such as nulliparous with perineal laceration, breastfeeding mothers, experiencing postpartum fatigue and depressive symptoms to improve their sexual health and quality of life. *(Afr J Reprod Health 2023; 27 [11]: 55-62).*

Keywords: Female sexual dysfunction, postpartum depression, postpartum fatigue, postpartum women

Résumé

La fonction sexuelle des femmes en post-partum est souvent négligée par les professionnels de la santé. Cette étude visait à étudier les facteurs associés au dysfonctionnement sexuel chez les femmes en post-partum. Cette étude a utilisé un plan d'étude transversal. Au total, 135 femmes en post-partum provenant d'un hôpital universitaire du nord de Taiwan et répondant aux critères d'inclusion ont été recrutées. SPSS version 22.0 a été utilisé pour analyser les données, y compris une analyse descriptive et bivariée. Une régression linéaire multiple était utilisée pour identifier les prédicteurs de dysfonctionnement sexuel chez les femmes taïwanaises en post-partum. Les résultats ont indiqué que les catégories de dysfonctionnement sexuel les plus fréquemment rencontrées chez les femmes en post-partum étaient le manque de désir sexuel, le retard ou l'absence d'orgasme, la douleur pendant les rapports sexuels et l'incapacité d'être physiquement excitée. La parité, les types d'accouchement, les lacérations périnéales, l'allaitement, la fatigue post-partum et la dépression post-partum étaient significativement associés à la dysfonction sexuelle ($p < 0,05$). Des conseils sexuels et un soutien mental devraient être nécessaires pour les femmes présentant un risque de problèmes sexuels post-partum, telles que les nullipares présentant une lacération périnéale, les mères allaitantes, les femmes souffrant de fatigue post-partum et de symptômes dépressifs, afin d'améliorer leur santé sexuelle et leur qualité de vie. *(Afr J Reprod Health 2023; 27 [11]: 55-62).*

Mots-clés: Dysfonction sexuelle féminine, dépression post-partum, fatigue post-partum, femmes en post-partum

Introduction

Sexual health is a fundamental determinant of women's well-being that affects the lives of reproductive-aged women[1]. Sexual dysfunction has been described as an impairment of normal sexual function that prevent a person or couple from experiencing satisfaction from sexual activity. Sexual dysfunction generally is classified into four categories: lack of sexual desire or interest in sex, inability to become physically aroused or excited during sexual activity, delay or absence of orgasm, and pain during intercourse[2]. Women after pregnancy and childbirth bring enormous biological and psycho-social changes that can indirectly affect their sexual function[3]. Previous studies have shown that 41-83% of postpartum women experienced sexual dysfunction such as dyspareunia, vaginal dryness, orgasmic disorder, vaginal relaxation, low sexual desire, bleeding, or inflammation after

intercourse, and decline in sexual frequency[1]. These sexual problems can continue 1 year after childbirth and significantly impacts women's quality of life[4]. Therefore, exploring the associated factors of sexual dysfunction may help healthcare professionals to better detect and provide adequate interventions for postpartum women with sexual dysfunction.

Sexual dysfunction during the postpartum period is influenced by several physical, psychological and social-cultural factors[3]. Postpartum fatigue is one of the major predictors of sexual dysfunction. Postpartum fatigue is defined as a feeling of exhaustion and being overwhelmed combined with a decrease in mental and physical capacity, consequently affect women's health and the newborn's development. Most of women experience postpartum fatigue with a prevalence of up to 82%[5]. Study from Alligood-Percoco *et al*.[6] indicated that the most significant factors which led to low sexual desire during postpartum were fatigue and vaginal discomfort.

Postpartum depression (PPD) is one of most common mental health problems that begins 4 to 6 weeks after childbirth. It affects 1.9% to 82.1% of postpartum women in developing countries and from 5.2% to 74.0% in developed countries[7]. Symptoms of PPD include sleep disturbance and poor appetite, decreased concentration, irritability, anxiety, feelings of guilt and worthlessness, loss of interest in daily activities, depressed mood and even having suicide thoughts[8]. PPD was reported to be another important cause of sexual dysfuction[9]. Dağli *et al*. study[10] reported that as the risk of PPD increases, the prevalence of sexual dysfunction increases. In addition to several demographic and obstetric variables, such as maternal age, education, socio-economic status, marital status, the number of deliveries, type of delivery, perineal lacerations, episiotomy, and breastfeeding[11,12], factors such as postpartum fatigue and depression are also important influences on postpartum sexual function. However, only a small number of scholars have investigated the association between these two variables and postpartum sexual function. There is a greater need for more empirical research in this area.

Sexual problems are common in the postpartum period. However, women's sexual function during postpartum period is often overlooked by healthcare professionals, both in Taiwan and elsewhere[1]. Moreover, none of previous studies have investigated the associations among postpartum fatigue, postpartum depression, and sexual dysfunction in postpartum women in Taiwan. This study aimed to fill this knowledge gap. Gaining insight into sexual function in the postpartum period would empower healthcare professionals to address sexual health issue and offer effective treatment for women experiencing sexual dysfunction.

Methods

Research design/sample and setting

A cross-sectional research design was adopted in this study to examine the associations between demographic and obstetric variables, postpartum fatigue, postpartum depression, and sexual dysfunction in postpartum women. Research studies have shown a high prevalence of sexual dysfunction in the first 3 months of postpartum period[1]. Thus, this study recruited postpartum women who had given livebirth within three months of the study as participants through convenience sampling at a teaching hospital in northern Taiwan.

Sample size determination

The required sample size was estimated using G*Power 3.1.2 software. On the basis of the multiple linear regression using fixed model R^2 deviation from 0, the effect size was set at 0.15, type I error was 0.05, and power was 0.8 for a sample size of 135. During the period of data collection, this study distributed 385 questionnaires. Eventually, 135 valid samples were included in the analysis, posting a response rate of 35.06%.

Inclusion/Exclusion criteria

The inclusion criteria were: age between 20-44 years, had a regular sexual partner, gave birth to a live baby at week 37 or later in pregnancy, gave birth 0-3 months (included NSD and C/S), had already returned to sexual intercourse prior to completing the questionnaire, being able to read

and write in Chinese or Taiwanese and providing a written consent form. Women were excluded if they had evidence of a psychiatric condition (such as has been diagnosed with major depression and mental disorders; a prescription claim for a filled antidepressant or antianxiety medication), or hospitalized due to maternal or infant comorbidity.

Study variables

Study variables were determined after a systematic literature review. Data was collected by structured questionnaires which including demographic/obstetric variables, Visual Analogue Scale-Fatigue (VAS-F), Edinburgh Postnatal Depression Scale (EPDS), and Female Sexual Function Index (FSFI).

Independent variables

Demographic/obstetric profiles: Demographic variables included maternal age, educational level, occupational, and marital status. Obstetric variables were extracted recorded from medical records that included parity, method of delivery (NSD or C/S), perineal laceration (yes or no) and breastfeeding (yes or no).

Visual Analogue Scale-Fatigue (VAS-F): VAS-F was uses to measure the subjective experience of fatigue severity in postpartum women[13]. The scale consists of 18 items, which are divided into two subscales, fatigue (13 items) and energy (5 items). Each item is scored with a visual analogy (ranged from 0 to 10), higher mean score represents a higher degree of fatigue. The VAS-F has demonstrated a high internal reliability ranging from 0.94 to 0.96 by Lee and colleagues[13]. Lee *et al*.[13] advised setting the cut-off point of mild fatigue as less than 3.4; that of moderate fatigue, 3.4-6.7; and that of severe fatigue, 6.8-10. The Cronbach's α reliability obtained in this study was 0.90.

Edinburgh Postnatal Depression Scale (EPDS): EPDS was used to investigate the depressive symptoms in postpartum women[14]. It is composed of 10 items; each item is given a score of 0 to 3. The maximum score is 30, with a higher score indicating a higher level of depressive symptoms. EPDS has been translated into Chinese by Heh[15] and shown good current validity (*r*= .79) and internal consistency (Cronbach's α= 0.87). The Cronbach's α obtained in this study was 0.84.

Dependent variables

Female Sexual Function Index (FSFI): FSFI was used to assess women's sexual function during the postpartum period[16]. It is a 19-item questionnaire and has six domains: sexual desire (2 items), orgasm (3 items); lubrication (4 items), arousal (4 items), satisfaction (3 items), and pain (3 items). A lower score corresponds to a poorer sexual function. FSFI scores ≤ 26.55 was identified as sexual dysfunction[17]. Numerous validation studies have reported acceptable reliability and validity for FSFI[18]. The Cronbach's α obtained in this study was 0.95.

Data collection

Data was collected at the outpatient department of Obstetrics and Gynecology of a teaching hospital in northern Taiwan. The primary researcher contacted the director of the Department of Obstetrics and Gynecology to obtain a name list of postpartum women. The primary researcher selected those who meet the inclusion criteria after reviewing the medical records. The questionnaires, together with research information sheet were mailed and collected anonymously (in a return envelope). All collected data were properly stored and secured and were used exclusively for academic research purposes.

Data processing and analysis

Data analysis was analyzed using the Statistical Package for the Social Sciences (SPSS) version 22.0. Distribution of research variables were analyzed by mean, standard deviation, frequency, and percentage. The sexual dysfunction in this study was normal distribution evaluating by the Kolmogorov-Smirnov and Shapiro-Wilk tests ($p > 0.05$). Therefore, associations were tested using Pearson correlation coefficient and independent sample t-test. Multiple linear regression was used to predict factors affecting the sexual dysfunction in postpartum women. P-value of less than 0.05 was considered statistically significant.

Results

Demographic/obstetric variables

One hundred and thirty-five women who met the inclusion criteria were enrolled in the study. Mean age of the subjects was 33.56 (*SD* ±3.91) years. Most women were employed (79.3%) and had a diploma or college degree (80.7%). More than half of them were primiparous (60%) and mainly by vaginal delivery (69.6%). Nearly 94% of women by vaginal delivery received episiotomy. In all, 82.2% of the women breastfed their children (Table 1).

The level of postpartum fatigue and depression

Most of women (83.7%) experienced moderate to severe levels of postpartum fatigue by a mean score of 4.85 (*SD*±1.38). Mean score of EPDS was 7.87 (*SD* ±4.47). Based on Heh[15,] using a cut-off score of ≥ 9 as having developed postpartum depression, around 31.9% of women experienced postpartum depression (Table 1).

Sexual function in postpartum women

Mean score of FSFI was 22.05 (*SD* ±5.42). Based on Wiegel *et al*.[17], using a cut-off score of ≤ 26.55 as having sexual dysfunction, around 77.8% of women experienced sexual dysfunction. Lack of sexual desire was the most prevalent sexual dysfunction (*M*±*SD*: 2.59±0.87), followed by delay or absence of orgasm (*M*±*SD*: 3.43±1.07), pain during intercourse (*M*±*SD*: 3.86±1.35), inability to become physically aroused (*M*±*SD*: 3.98±1.35), lubrication difficulties (*M*±*SD*: 4.08± 1.08), and sexual dissatisfaction (*M*±*SD*: 4.10±1.05). Distribution of demographic/obstetric characteristics, VAS-F, EPDS, and FSFI of participants were presented in Table 1.

Associated factors of sexual function in postpartum women

The associations between participants' demographic/obstetric characteristics, VAS-F, EPDS, and FSFI were presented in Table 2. The results indicated that there was a significant difference between parity and lubrication difficulties ($p < 0.05$). Also, there was significant difference between method of delivery and lubrication difficulties, and pain during intercourse ($p< 0.05$). Delay or absence of orgasm, lubrication difficulties, inability to become physically aroused, and pain during intercourse were significantly higher among exclusively breastfeeding women compared with their counterparts ($p< 0.05$).

Table 1: Distribution of demographics, VAS-F, EPDS, and FSFI of participants (N= 135)

Variables		N M±SD	% Range
Age (years)		33.56±3.91	22-44
	< 35	81	60.0
	≥ 35	54	40.0
Educational status	≤ under graduated	109	80.7
	> graduated	26	19.3
Job	Housewife	28	20.7
	Employed	107	79.3
Parity	Primiparous	81	60.0
	Multiparous	54	40.0
Type of delivery	NSD	94	69.6
	C/S	41	30.4
Breastfeeding	No	24	17.8
	Yes	111	82.2
Perineal laceration	No	47	34.8
	Yes	88	65.2
VAS-F		4.85±1.38	1-8.6
	< 3.4 (mild fatigue)	22	16.3
	3.4-6.7 (moderate fatigue)	106	78.5
	6.8-10 (severe fatigue)	7	5.2
EPDS		7.87±4.47	0-20
	≤ 9 (no postnatal depression)	92	68.1
	> 9 (postnatal depression)	43	31.9
FSFI		22.05±5.42	7.2-33.9
	> 26.55 (no sexual dysfunction)	30	22.2
	≤ 26.55 (sexual dysfunction)	105	77.8
FSFI: sub-domains	Sexual desire	2.59±0.87	
	Orgasm	3.43±1.07	
	Arousal	3.98±1.35	
	Pain	3.86±1.35	
	Lubrication	4.08±1.08	
	Satisfaction	4.10±1.05	

Table 2: Associations between demographic/obstetric variables, VAS-F, EPDS, and FSFI

Variables	FSFI desire M±SD	orgasm	lubrication	Arousal	Satisfaction	Pain	Total
Age (years)	t= .60	t= .54	t= -.16	t= .54	t= .60	t= -.30	t= .34
< 35	2.62±0.95	4.03±1.41	4.07±1.15	3.47±1.11	4.15±1.13	3.83±1.30	22.18±5.72
≥ 35	2.53±0.75	3.90±1.26	4.10±0.96	3.37±1.03	4.04±0.94	3.90±1.43	21.85±4.97
Educational status	t= .46	t= -1.12	t= -.99	t= -1.00	t= -1.78	t= -1.17	t= -1.24
≤ under graduated	2.60±0.89	3.92±1.35	4.04±1.11	3.39±1.10	4.03±1.06	3.79±1.33	21.77±5.51
> graduated	2.52±0.83	4.25±1.37	4.23±0.93	3.62±0.95	4.43±0.99	4.14±1.42	23.22±4.93
Job	t= .33	t= .91	t= -.65	t= -.15	t= -.50	t= .24	t= .08
Housewife	2.64±1.00	3.92±1.35	4.19±1.31	3.41±0.94	4.01±1.11	3.91±1.33	22.12±5.04
Employed	2.57±0.84	4.25±1.37	3.93±1.36	3.44±1.11	4.13±1.14	3.85±1.35	22.03±5.53
Parity	t= -1.23	t= .27	t= -1.99*	t= .20	t= -.60	t= -.35	t= -.69
Primiparous	2.51±0.85	4.00±1.42	3.93±1.11	3.45±1.11	4.06±1.11	3.83±1.38	21.78±5.71
Multiparous	2.70±0.91	3.94±1.25	4.31±0.99	3.41±1.02	4.17±0.97	3.91±1.30	22.44±4.96
Types of delivery	t= -.54	t= -1.45	t= -2.01*	t= -1.14	t= -.95	t= -2.33*	t= -1.84
NSD	2.56±0.89	3.87±1.42	3.96±1.13	3.36±1.06	4.05±1.10	3.69±1.33	21.48±5.61
C/S	2.65±0.85	4.23±1.16	4.36±0.89	3.59±1.11	4.23±0.93	4.26±1.32	23.33±4.76
Breastfeeding	t= -1.64	t= -2.39*	t= -3.27***	t= -2.80**	t= -1.44	t= -2.91**	t= -3.10**
No	2.85±1.22	4.57±1.09	4.71±0.76	3.98±1.14	4.38±0.97	4.57±1.21	25.05±4.82
Yes	2.53±0.81	3.85±1.38	3.95±1.09	3.32±1.02	4.04±1.07	3.71±1.33	21.40±5.32
Perineal laceration							
No	t= .91	t= 1.62	t= 2.06*	t= 1.12	t= .88	t= 2.54*	t= 2.09*
Yes	2.68±0.80	4.22±1.17	4.34±0.87	3.57±1.04	4.21±0.94	4.26±1.29	23.29±4.64
	2.54±0.91	3.85±1.43	3.94±1.15	3.36±1.08	4.05±1.11	3.65±1.34	21.38±5.70
VAS-F	r= -.16	r= -.04	r= .03	r= -.11	r= -.20*	r= -.01	r= -.10
EPDS	r= -.10	r= -.15	r= -.16	r= -.18*	r= -.26**	r= -.19*	r= -.22*

Based on independent t-test and Pearson's correlation coefficient, *p < 0.05, **p < 0.01, ***p < 0.001

Table 3: Predictors of sexual dysfunction for postpartum women

Independent variable	B	SE B	β	T value
Parity	0.54	0.93	0.05	0.58
Types of delivery	0.35	2.35	0.03	0.15
Perineal laceration	-1.21	2.25	-0.11	-0.54
Breastfeeding	-3.26	1.20	-0.23	-2.73**
VAS-F	0.14	0.37	0.04	0.38
EPDS	-0.26	0.11	-0.22	-2.31*

Based on multiple linear regression
F= 3.17 (6, 128) **, R^2= 0.13, R^2 adjusted= 0.09, *p < 0.05, **p < 0.01

Lubrication difficulties and pain during intercourse were significantly higher among women who had perineal laceration compared with their counterparts (p< 0.05). In addition, sexual dissatisfaction was significantly negatively correlated with postpartum fatigue (r= −0.20*). Delay or absence of orgasm, sexual dissatisfaction, and pain during intercourse were significantly negatively correlated with postpartum depression (r= −0.18*-−0.26*). The results of multiple linear regression in predicting sexual dysfunction in postpartum women were presented in Table 3. The results revealed that the most significant predictive power on sexual dysfunction was observed in breastfeeding (t= -2.73**), and postpartum depression (t= -2.31*).

Discussion

This study aimed to assess women's sexual functioning in the postpartum period and its associated factors. Overall, the results showed that 77.8% of women experienced sexual dysfunction. In addition, the types of sexual dysfunction that

most commonly experienced in postpartum women were lack of sexual desire, delay or absence of orgasm, pain during intercourse, and inability to become physically aroused. Parity, types of delivery, perineal laceration, breastfeeding, postpartum fatigue, and postpartum depression were significantly associated with sexual dysfunction. Breastfeeding and postpartum depression were the most important predictors of sexual dysfunction in postpartum women.

In the present study, 77.8% of women during the first 3 months postpartum period experienced sexual dysfunction. Previous studies have shown similar results at prevalence rates of 41%-83% at 2-3 months after birth[1,19,20]. Comparing with other Asian countries such as Malaysia (35.5%) and Thailand (30%), the prevalence of sexual dysfunction in postpartum Taiwanese women is high, possibly because Taiwan is a developed country that women are more open and willing to talk about sexuality[3,21].

In this study, the most prevalent types of sexual dysfunction reported were lack of sexual desire, followed by delay or absence of orgasm, pain during intercourse, and inability to become physically aroused. Dissatisfaction and lubrication difficulties were less common sexual dysfunction among postpartum women in Taiwan. Three mechanisms may contribute to sexual dysfunction afterbirth including dyspareunia, birth canal injury and overall general health of mother. Dyspareunia or pain during intercourse is extremely common, especially within six months of postpartum[6]. Previous research has also shown that lack of sexual desire and delay or absence of orgasm were the most prominent sexual dysfunction for postpartum women[1,22,23].

This study found that sexual dysfunction during the postpartum period were associated with parity, types of delivery, perineal laceration, breastfeeding, postpartum fatigue, and postpartum depression. This study indicated that sexual dysfunction was more prevalent in primiparous than multiparous. Those who underwent vaginal delivery and episiotomy had more lubrication difficulties and pain during intercourse than those who underwent a C-section and without perineal trauma. It may be explained by high rates of episiotomy (93.4%) in primiparous in the present study. Although the WHO (World Health Organization) suggested that episiotomy should not be administered as routine practice, episiotomy is still the most common obstetrical procedures in Taiwan[24]. Perineal laceration negatively affects pelvic floor function and is related to the occurrence of perineal pain, painful intercourse, and vaginal dryness, all of which can lead to impaired sexual function[21]. Compared to women who had C-section deliveries, the rate of pelvic floor dysfunction, such as vaginal enlargement and urinary and fecal incontinence was found to be higher, and therefore, sexuality was observed to be negatively affected in women who had a vaginal delivery[10].

The current study showed that the prevalence of sexual dysfunction in breastfeeding women was 23.7% higher than non-breastfeeding women. Those who breastfed encountered more difficulties in arousal, lubrication, orgasm, and pain than those who did not breastfeed. This study confirmed findings of previous studies that breastfeeding was a significant risk factor for postpartum sexual dysfunction[19]. Breastfeeding women have high levels of prolactin and decreased levels of androgens and estrogens due to the ovarian suppression which may cause vaginal dryness, dyspareunia, increased breast sensitivity, leaking milk and decreased arousal[1].

In this study, majority of women (87.3%) experienced moderate to severe levels of postpartum fatigue. Previous research has found that postpartum fatigue is related to lower sexual function[9]. Fatigue due to the responsibilities of motherhood, stress and sleep disorder have been reported as the cause of decreased sexual desire in the first months of postpartum[25].

In this study, 31.9% of the women were at risk for postpartum depression. This study showed that postpartum depression was a significant predictor of sexual dysfunction. Those with more postpartum depressive symptoms had more sexual dysfunction on delay or absence of orgasm, pain during intercourse, and sexual dissatisfaction. During the postpartum period, women experience many alterations in their physical, mental and sexual health. Depressive symptoms during the postpartum period are associated with reduced sexual desire and satisfaction as well as limited or delayed onset of sexual intercourse[26].

Recommendations for clinical practices

Healthcare professionals play an important role in the prevention, evaluation, and treatment of postpartum sexual dysfunction. Healthcare professionals should routinely screen for signs of postpartum women's fatigue, depression and sexual function and provide birth education programs from antenatal period and to inform women and their partners about these postpartum sexual changes. Women should also be encouraged to share their sexual concerns to healthcare professionals in order for proper assessments and treatments to be carried out. In addition, sexual counseling and mental support should be necessary for women at risk of postpartum sexual dysfunction such as nulliparous with perineal trauma, exclusively breastfeeding mothers, experiencing postpartum fatigue and depressive symptoms to improve their sexual health and quality of life[8].

Limitations/Future research

The current study uses FSFI for identifying the types of female sexual dysfunction and have identified several associated factors of sexual dysfunction among postpartum women in Taiwan. Findings form this study should be taken into account by healthcare professionals in order to design interventions in promoting the quality of sexual life for postpartum women. The present study has some limitations. Firstly, this was a cross-sectional study that recruited a convenient sample of 135 postpartum women, from one teaching hospital of the northern Taiwan that might reduce the power of the study and increase the margin of error. Therefore, the sample and findings could not be generalizable to the entire population of postpartum Taiwanese women. Secondly, the participants completed a self-reported mailing questionnaire which possess inherent limitations. Finally, social and cultural factors such as medical condition, social support, marital relationships that may be related to sexual function were not investigated; therefore, future studies are recommended to take them into account. Due to its cross-sectional nature, the cause-and-effect relationships between the variables affecting sexual function cannot be determined. Longitudinal studies or qualitative research are recommended to provide more insight into the underlying mechanism of the relationships found in this study.

Conclusion

Findings from this present study highlight important concerns regarding female sexual functioning during the postpartum period. The majority participants suffered postpartum sexual dysfunction, and their sexual functioning was associated with several physical and psychological factors (e.g., parity, method of delivery, perineal laceration, types of feeding, postpartum fatigue and depression). In the light of this research results, healthcare professionals should routinely assess sexual and psycho-mental problems of women in each antenatal and postnatal check-ups. For women at the high-risk groups of sexual problems that indicated in this study should be carefully screened and properly referred for early diagnosis and treatment.

Authors contributions

Fang-Jung Lee and Yu-Ying Lu took part in research design, data collection, data analysis, interpretation, and manuscript development. Yu-Ying Lu gave critical revision of this research.

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Ethical approval

Ethical approval for the study was gained from the Institutional Review Board of Taiwan Adventist Hospital (ref no. 103-E-02 0988710613w). All study subjects consented to it before data collection.

Conflict of interest

All authors declare that they have no conflict of interest.

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