Factors Associated with Sexual Dysfunction among Men with Type 2 Diabetes Mellitus in Botswana

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Abstract

This descriptive correlational study aimed to examine the prevalence of sexual dysfunction and its associated factors, including age, health status, diabetes duration, HbA1C, and couple satisfaction with sexual dysfunction among men with T2DM in Botswana. Engel's Biopsychosocial Model served as the conceptual framework (Engel, 2012). Simple random sampling was used to recruit 200 men with T2DM attending an outpatient diabetes clinic in Botswana. The tools used included a demographic questionnaire, the Short Form-12 (SF-12), the Couples Satisfaction Questionnaire (CSQ-4), and the Changes in Sexual Functioning Questionnaire (CSFQ-14). Data were analyzed using descriptive statistics and Pearson correlation.

Results revealed that 64.5% of participants had HbA1C levels ≥8%, indicating poor glycemic control (HbA1C ≥ 8%). 70 % (n = 140) of participants reported sexual dysfunction. Strong positive correlations were found with age ($r = .547$, $p < .001$), and moderate correlations were observed for diabetic duration ($r = .375$, $p < .001$). Weak positive correlations were observed with couple satisfaction ($r = .189$, $p = .007$), while negative correlations were observed with health status ($r = - .235$, $p < .001$). However, no significant correlation was found between sexual dysfunction and HbA1c levels.

Sexual dysfunction is highly prevalent among men with type 2 diabetes mellitus. Age, health status, diabetes duration, and couple satisfaction were significantly associated with sexual dysfunction. Healthcare interventions should focus on promoting overall health status, improving diabetes control, and providing couples counselling to enhance relationship quality, thereby improving sexual health outcomes in men with type 2 diabetes mellitus.

Key words: Sexual dysfunction, Men with type 2 diabetes mellitus, Couple satisfaction, Botswana

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Significance of the problem

Type 2 Diabetes Mellitus (T2DM) is a condition caused by insufficient insulin production, obesity, genetic mutations, hormonal disorders, and pancreatic damage (World Health Organization, 2024). It leads to biochemical variations, pathological changes and complications in organs like the eyes, kidneys, heart, and genitourinary, resulting in sexual dysfunction (SD) (Banday et al., 2020)

Botswana, situated in southern Africa, like many countries, faces a significant diabetes mellitus (DM) problem. The World Health Organization (2022), stated that DM is the sixth leading cause of death in Botswana. The country was expected to have 78,100 diabetes cases in 2021, with T2DM accounting for 5.2%. In 2020, Botswana accounted for 6.56 % of diabetes fatalities, ranking ninth globally. Over 80% of diabetic patients have complications like cardiovascular disease, chronic kidney disease, and diabetic retinopathy (Rwegerera et al., 2018). In 2022, Block 6 clinic, a diabetes-specialized clinic in Gaborone, Botswana, treated 1,100 T2DM patients monthly, with 38.6% being men, seeing 20-21 T2DM men daily. Although no study has been conducted on the prevalence of SD among men with T2DM, it is likely to exist in Botswana.

Sexual dysfunction is a condition where an individual experiences loss of sexual drive, desire, arousal, and fulfillment (WHO, 2022). It is classified according to sexual cycle response being erectile dysfunction, hypoactive sexual desire, pain disorder, and orgasm disorder (Olivier, 2017). In Ethiopia, the prevalence of SD is highest in orgasm disorder at 99.5%, followed by erectile disorder at 99.3%, desire disorder at 91.8%, pain disorder at 42%, and pleasure disorder at 52.4% (Getie Mekonnen et al., 2021).

The global aging population and rising DM rates contribute to high overall SD incidence in T2DM men, negatively impacting their quality of life (QoL). Chronic medical disorders like DM can lead to SD, affecting their physiological, social, and psychological well-being (Anderson et al., 2022). Stress exacerbates hyperglycemia, leading to additional illnesses, complications, and rehospitalization, affecting patients' QoL (Elterman et al., 2021). Prolonged hyperglycemia can also decrease sperm quality, potentially affecting fertility or impotence (Chen et al., 2019). Inability to engage in regular sexual activity can lead to dissatisfaction, low self-esteem, feelings of insecurity, inadequacy, and unmasculinity (Thongtang & Seesawang, 2020). According to Das et al. (2018), men are more prone to developing T2DM complications due to their less aggressive health pursuits than women; hence, it is imperative to explore factors associated with SD in men with T2DM in Botswana, with a conscious awareness of the SD impact.

According to the literature review, variables associated with SD may be divided into three categories: biological, psychological, and social (Zarif Golbar Yazdi et al., 2020). By integrating these elements, the Biopsychosocial model highlights that a holistic approach encompassing all domains is necessary to evaluate and address patient requirements, while each area alone is insufficient (Engel, 2012).

In this study, biological domains such as age, diabetes duration, and HbA1C were investigated, whereas the psychological domain included health status and couple satisfaction. The variables were chosen based on the aforementioned domains and the WHO's major objective for DM: controlling blood glucose and achieving good HbA1C levels. The age factor can influence self-management and self-care of T2DM, which, if not addressed properly, can lead to complications such as SD; hence, it was chosen to investigate the prevalence of SD among men with T2DM in Botswana.

Age in men with T2DM is defined as the time from birth and study, expressed in solid years (United Nations, 2017). Literature review found that SD is common in men with T2DM, especially older men (Defeudis et al., 2022). While SD is considered normal with ageing, sexuality remains a key aspect of masculinity and is part of how men define themselves, and it exists independently, and even as they age, they continue to enjoy a sex life (Chung, 2019).

Diabetes duration is the time from when a physician diagnoses T2DM with a high blood sugar level (126 mg/dl or above) to the study date (World Health Organization, 2022). This is the number of years since the patient was diagnosed with T2DM. Diabetes-related SD is mostly neurogenic and vasculogenic (Hurisa & Negera, 2020).

HbA1C is a test that measures the average blood glucose level in men with T2DM during the previous 2-3 months, showing glycemic control (Selvin, 2021). A literature review found a link between uncontrolled blood sugar and the occurrence of SD in men with T2DM, and poor glycemic control is a risk factor for SD, which has been shown to worsen with the duration of T2DM (Hurisa & Negera, 2020).

Health status is men's perceptions of their health in terms of a function/dysfunction continuum of everyday activities, which may be judged as excellent or poor, both physically and mentally (Centers for Disease Control and Prevention, 2024). SD has a significant impact on the health status of men with T2DM because it causes men to lose self-esteem and self-efficacy (Thongtang & Seesawang, 2020). The emphasis is on patient-centered health care as mental health is a key issue, necessitating interventions that address both the physical and emotional health of men with T2DM.

Couple satisfaction is defined as true joy, pleasure, and satisfaction felt by men with T2DM in their relationships (Asadi et al., 2020). Sexual interactions are the most important factors impacting personal happiness and married life, and if dissatisfied, it leads to poor psychological well-being, expressing feelings of failure and insecurity (Heidari et al., 2019). Furthermore, low self-esteem, which relates to a loss of masculinity in men, decreased sexual and emotional closeness in a couple relationship, may lead to divorce in many cases (Cooper et al., 2018).

Despite substantial worldwide research, no studies have been conducted in Botswana on SD and its associated factors in men with T2DM. Cultural stigma, a lack of information, and an unwillingness to perceive SD as a masculine issue all contribute to this disparity. Addressing it can provide useful insights for nursing practice and help shape treatments aimed at lowering the psychological and social costs of SD in this group.

Research Objectives

1. To assess the prevalence of sexual dysfunction among men with type 2 diabetes mellitus in Block 6 clinic in Botswana.

2. To examine the associations between selected factors, including age, health status, diabetes duration, HbA1C, and couple satisfaction with sexual dysfunction among men with T2DM in Botswana.

Research Hypothesis

There were relationships between age, diabetes duration, HbA1C, health status, and couple satisfaction with sexual dysfunction among men with type 2 diabetes mellitus in Botswana.

Conceptual Framework

The present study was conducted in accordance with Engel's Biopsychosocial Model, which emphasizes that health and illness are not solely determined by biological processes, but also by psychological states (including stress, emotions, and behavior) and social surroundings (including relationships and culture). This model was employed to direct the investigation of the causal pathway by which the five variables of age, diabetes duration, HbA1C, health status, and couple satisfaction may correlate with the overall sexual dysfunction of male patients. The model was selected to investigate the factors that are associated with sexual dysfunction in men with T2DM. This is achieved by establishing a complex relationship among a variety of biological, psychological, and social factors that are associated with sexual dysfunction in men with T2DM, as illustrated in Figure 1.

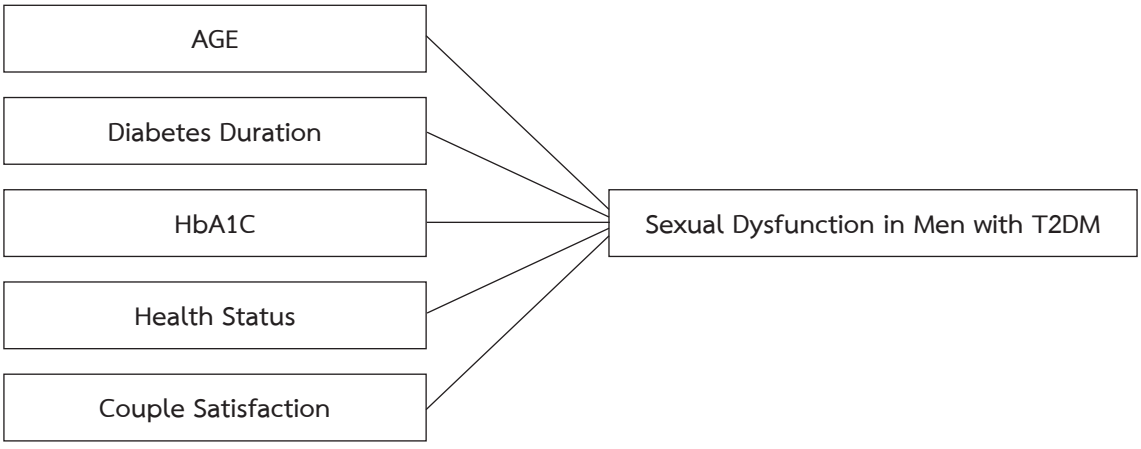

Figure 1 Research framework

Methods

Research Design

A descriptive correlational design was used to investigate factors associated with sexual dysfunction among men with T2DM at Block 6 clinic, Gaborone, Botswana.

Population and Sample

The target population of the proposed study was men with T2DM in Gaborone, Botswana, who sought care at Block 6 clinic during April to June 2025.

The sample was composed of men with T2DM who come to Block 6 clinic for diabetes services and met the following criteria: 1) age 35 to 75 years old; 2) T2DM diagnosis identified on patient's medical record before the recruitment date in the past 5 years; 3) was sexually active in the last 3 months; 4) no mental illness (which was documented on patient medical cards); 5) no disabilities such as blindness or hearing loss, paralysis or weakness; 6) If there were co-morbidities, it was in stable condition; and 7) be able to understand, read and write in Setswana (official language of Botswana)

The sample size was determined using G*Power, with a Pearson r correlation effect size (small) = 0.20, power 0.80, 2-tailed, alpha = 0.05, yielding a sample size of 193. The sample size was increased by 10 participants to account for possible outliers; 3 outliers were identified during analysis and deleted, resulting in a sample size of 200, which was sufficient for normal distribution analysis. Eligible participants were recruited by a simple random sampling technique. Ten participants were randomly selected each working day (Monday to Friday) until the prescribed sample size of 200 was reached.

Research Instruments

Four instruments were used to collect data in this study. All instruments were used with permission. The Cronbach's alpha was used to determine the reliability of each instrument in 30 men with T2DM, who had the same characteristics as the sample of the study

1) The demographic information questionnaire

The demographic questionnaire was a self-report developed by a researcher aimed at describing the study sample regarding personal characteristics. It includes a) the general information: age, marital status, level of education, smoking cigarettes, drinking alcohol, and socio-economic status; and b) the health information (collected from patients' medical records), including diabetes duration, glycemic control (HbA1C), BMI, comorbidities, diabetic medications, any traditional medicine, and T2DM complications.

2) The Short Form-12 v2 (SF-12 vs 2)

The Short Form-12 (SF-12) was employed to evaluate health status from the patient's perspective. It was a revised version of the original SF-36, which was developed by Ware et al. (1996). This multi-purpose generic health status questionnaire comprises 12 items that measure 8 health domains under 2 subscales: physical and mental health. The questionnaire has been validated across a variety of chronic diseases and conditions. Reliability of the physical health domain was at Cronbach's alpha 0.79, mental health domain was at Cronbach's alpha 0.85 (Ibrahim et al., 2020). The Cronbach alpha in this study was 0.9.

3) The Couple Satisfaction Index - (CSI-4)

Funk and Rogge (2007) developed the Couple Satisfaction Index-4 (CSI-4), a validated

self-report instrument, to assess the satisfaction of couple relationships in this study. The total score range of 0 to 21 is achieved by rating responses on a combination of 6-point and 7-point Likert scales, which are comprised of four items. Significant relationship dissatisfaction is indicated by scores below 13.5 (Funk & Rogge, 2007). Omani-Samani et al. (2018) have demonstrated that the CSI-4 is highly reliable, with a Cronbach alpha of 0.846. The Cronbach alpha in this study was 0.85.

4) The Changes in Sexual Function Questionnaire M-C (CSFQ-14)

The study used the Changes in Sexual Function Questionnaire (CSFQ-14), a validated short-form instrument designed to measure sexual SD in men, created by Clayton et al. (2002). The CSFQ-14 consists of 14 items scored on a 5-point Likert scale, addressing three areas of sexual functioning: desire, arousal, and orgasm. A total score of 47 or below in men or scores below predetermined cut-offs in any subscale suggest SD. The technique offers a systematic assessment of sexual function throughout the sexual response cycle. The scale has good internal consistency in the male version of Cronbach's alpha of 0.72, making it a reliable psychometric property (Asefa et al., 2019). The Cronbach alpha in this study was 0.82.

Data Collection

Data were collected using simple random sampling to recruit 200 men with T2DM attending out-patient care at Block 6 clinic in Gaborone, the capital city of Botswana, by the researcher and a trained male research assistant. Eligible participants who expressed interest in taking part in the study were asked to independently complete the study questionnaire in a private location after signing a consent form. All participant data was kept confidential. The researcher on-site validated questionnaire completion. Data collection continued until the required sample size was reached.

Data Analysis

Data were analyzed using SPSS statistical software. The alpha (α) level of statistical significance was set at 0.05. Descriptive statistics were used to describe participants' characteristics, including frequencies, means, and standard deviations. Pearson's product-moment correlation was used to examine the relationships between sexual dysfunction, age, diabetes duration, HbA1C, health status, and couple satisfaction. All assumptions for Pearson correlation were met.

Ethical consideration

Burapha University's Institutional Review Board approved this study under protocol code G-HS 100/2566 (12/January/2024), and the Botswana Ministry of Health approved it under protocol code HPRD:6/14/1 (8/March/2024). All participants provided informed consent before any data were collected. They voluntarily participated after being fully informed of the study goals.

Results

Part 1: Demographic characteristics of participants

The study included 200 men with T2DM, aged 35-70 years, with a mean age of 54 years. Most of the age falls in the middle age (44-59 years) at 51.5 %. A larger proportion of marriage status falls under married (60%), followed by single (34%). The majority (33%) had a tertiary education. For

individual income, 35 % had no income. 18% of participants drink alcohol, and 5.5 % smoke cigarettes currently.

66.5% of participants had DM for 5-10 years. Regarding glycemic control, 64.5% of participants had HbA1C levels ≥ 8%, indicating poor glycemic control, while 28% had moderate control (HbA1C 7-7.9%). Comorbidities were presented in 91% of participants, with hypertension being the most common (52.8%). Diabetes-related complications occurred in 64.5% of participants, with diabetic neuropathy being the most prevalent (46.5%), followed by combined diabetic neuropathy and diabetic retinopathy (31%).

Part 2: Description of sexual dysfunction

Table 1 presents information about sexual dysfunction (SD) and its subscales. Sexual dysfunction was measured by CSFQ-14, which has three subscales: desire, arousal, and orgasm. The SD cut-off point is 47; for the subscales, the desire cut-off points are 19 (both arousal and orgasm), as illustrated in Tables 1 and 2. The total score on the CSFQ-14 ranged from 21 to 59 out of 70, and the mean score was 42.34 (SD = 8.49). For the subscales, the desire had a mean score of 14.86 (SD = 3.12), the arousal had a mean score of 9.18 (SD = 2.58), and the orgasm had a mean score of 9.27 (SD = 2.38).

Table 1 Range, mean, and standard deviation of sexual dysfunction (n = 200)

Sexual dysfunction & subscales	Possible scores	Actual Scores	M	SD
Total SD	14-70	21-59	42.34	8.49
Desire	5-25	7-22	14.86	3.12
Arousal	3-15	3-14	9.18	2.58
Orgasm	3-15	3-13	9.27	2.38

Table 2 presents the prevalence of sexual dysfunction among participants. Overall, 70% (n = 140) of participants reported experiencing sexual dysfunction. Analysis by subscale revealed high prevalence rates across all domains: 89 % reported desire disorders, 99 % reported arousal disorders, and 100% reported orgasm disorders.

Table 2 Prevalence of sexual dysfunction in men with T2DM (n=200)

Sexual dysfunction	Yes / n (%)	No / n (%)
Overall SD	140 (70)	60 (30)
Desire	178 (89)	22 (11)
Arousal	198 (99)	2 (1)
Orgasm	200 (100)	-

Table 3 presents the descriptive statistics of study variables, including couple satisfaction, physical health status, and mental health status. The mean score of couple satisfaction was 13.50

(SD = 3.02). Overall health status showed a low level with a mean score of 38.78 (SD = 3.52). Both physical health status and mental health status scores were at mild levels, with mean scores of 18.82 (SD = 2.14) and 19.80 (SD = 2.14), respectively.

Table 3 Range, Mean and Standard deviation of variables (n = 200)

Variables	Possible score	Actual score	M	SD
Couple satisfaction	0-21	7-19	13.50	3.02
Health status	0-100	30-46	38.78	3.52
Physical health	0-50	14-23	18.82	2.14
Mental health	0-50	12-24	19.80	2.14

Part 3: Factors associated with sexual dysfunction among men with type 2 diabetes mellitus in Botswana

Table 4 shows a strong positive significant correlation between sexual dysfunction and age ($r = .547$, $p < .001$) and a moderate positive significant correlation between sexual dysfunction and diabetic duration ($r = .375$, $p < .001$). A weak positive correlation was observed between sexual dysfunction and couple satisfaction ($r = .189$, $p = .007$). Sexual dysfunction showed a significant negative correlation with health status ($r = -.235$, $p < .001$). However, there is no significant correlation found between sexual dysfunction and HbA1c levels ($r = .067$, $p > .05$).

Table 4 Relationships between study variables and sexual dysfunction among men with type 2 diabetes mellitus in Botswana (n = 200)

Variables	Correlation coefficient
Age	.547**
Diabetes duration	.375**
HbA1C	.067
Health status	-.235**
Couple satisfaction	.189**

* = $p < .05$, ** = $p < .01$

Discussion

Sexual dysfunction among men with T2DM in Botswana

The study discovered a significant prevalence of SD at 70%, with subscale prevalence of 89% for desire disorder, 99% for arousal disorder, and 100% for orgasmic disorder. This progression from fewer sexual ideas to inability to attain arousal and orgasm indicates serious SD. The average participant age was 54, with 51.5% aged 44-59 and 33.3% aged 60-70, pointing to age-related testosterone reduction as a biological risk factor. Low or no income (35%) restricts availability to diabetic meals in

Botswana, resulting in poor glycemic management and resultant SD. 36% of respondents reported having consumed alcohol, with long-term usage lowering blood flow and testosterone levels, aggravating the risk of SD.

Comorbidities were observed in 91% of individuals, with hypertension (52.8%) which promotes atherosclerosis and reduces penile blood flow. Furthermore, 65% experienced diabetes-related problems, with diabetic neuropathy accounting for 59%, which directly affects nerve impulses necessary for sexual function. These findings are consistent with the biological domain of the Biopsychosocial Model, which relates T2DM's effects on nerves and arteries to SD (Defeudis et al., 2022; Lugg, 2022). Demographic variables, such as age and comorbidities, exacerbate these biological disturbances, altering the neurogenetic, hormonal, and hemodynamic integration of sexual function.

Factors associated with sexual dysfunction among men with type 2 diabetes mellitus

Results of the study revealed that there were associations between age, diabetic duration, HbA1c, health status, and couple satisfaction with sexual dysfunction.

Age

Age was strongly linked with SD, with a mean age of 54.01 (SD = 9.39) and a strong positive connection (r =.547, p <.001). This lends credence to the biological domain of the Biopsychosocial model, suggesting that age-related testosterone reduction and SD are linked. The study reveals that males with T2DM are more likely to develop SD as they become older. These findings are comparable with those of Getie Mekonnen et al. (2021), who observed a 43% prevalence of SD in Ethiopian men over the age of 50.

Diabetic Duration

The average duration of diabetes was 10.29 years (SD = 5.30), and there was a strong positive link with SD (r =.375, p <.001). Longer diabetes duration, according to the Biopsychosocial model, is associated with neurogenic and vasculogenic consequences that lead to SD. These data lend credence to the idea that long-term diabetes exacerbates the physiological damage that leads to SD. Faselis et al. (2020) also discovered that males with T2DM are three times more likely to develop SD, with at least half impacted within 10 years of diagnosis.

HbA1C

The study's average HbA1C level was 10.20 (SD = 3.09), with no statistically significant relationship to sexual dysfunction (r =.067, p >.05). Despite the lack of significance, high HbA1C was associated with a high prevalence of SD, which is consistent with the Biopsychosocial model's biological domain. Chronic hyperglycemia may affect spermatogenesis, leading to SD. Hurisa and Negera (2020) found a 55% relationship between uncontrolled blood sugar and SD in Ethiopia. Shiferaw et al. (2020) discovered that males with HbA1C > 7% were more likely to suffer from Erectile dysfunction (ED) compared to those with lower values.

Health status

The study found a mean health status score of M = 38.78 (SD = 3.52), with physical health at M = 18.82 (SD = 2.14) and mental health at M = 19.80 (SD = 2.14). A substantial negative connection

was established between health status and sexual dysfunction (r = -0.235, p <.001), agreeing with the psychological domain of the Biopsychosocial model. The low physical and mental health scores indicate that poor health is a contributing factor to SD. Corona et al. (2020) found that SD decreases the quality of life and adherence of patients with diabetes. Thongtang and Seesawang (2020) found that worsening QoL was associated with ED severity in diabetic groups.

Couple satisfaction

The study discovered a mean couple satisfaction score of 13.50 (SD = 3.02), a statistically significant positive relationship between couple unhappiness and sexual dysfunction (r =.189, p =.007), and an overall dissatisfaction rate of 52%. Within the Biopsychosocial model's social domain, these findings indicate that relationship quality has a major influence on sexual health. Social contact and emotional closeness are inextricably tied to sexual function. The findings are consistent with Getie Mekonnen et al. (2021) observation that relationship dissatisfaction has a detrimental impact on psychological well-being and sexual desire. Poor health conditions may have exacerbated discontent and sexual dysfunction in this demographic.

The findings indicate a significant association between the selected factors and sexual dysfunction, consistent with the Biopsychosocial Model, which explains how interactions among biological, psychological, and social factors shape sexual functioning and well-being in individuals with type 2 diabetes mellitus.

Implication of the results

The study found a strong association between SD and men in Botswana. This emphasizes the need to include sexual health in diabetes management. It underscores the importance of treating not only the physical but also the psychological and social components of diabetes management. The findings imply that unresolved sexual dysfunction might have a significant impact on diabetic men's overall health and quality of life. Furthermore, cultural barriers and stigma may prevent frank talks, delaying diagnosis and care. The report also indicates a gap in healthcare providers' ability to address this issue properly.

Recommendation for Further Study

All men with T2DM should have regular SD screenings at health facilities. Diabetes care should take a comprehensive approach that includes sexual health examinations, counseling, and relationship assistance. Training programs for healthcare practitioners are required to enhance the identification and treatment of SD. Public awareness efforts should be implemented to educate communities and decrease stigma. Sexual health treatments need to be included in national diabetes strategies and primary care. More studies are needed to investigate the cultural, psychological, and physiological components of SD among T2DM men.

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Conflict of interest:

The authors declare no conflict of interest.

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