

Original Article

Prevalence of Psychiatric Co Morbidity in patients with Type 2 Diabetes

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Objective: To see the prevalence of psychiatric co morbidity in patients with Type 2 Diabetes in comparison with non diabetics.

Materials & Methods: The study was conducted in diabetic clinic of general medicine department of Pakistan Institute of Medical Science, Islamabad from Feb 2013 to April 2013. Study design was cross – sectional comparative. 52 T2DM (26 males and 26 females) were recruited. Control group comprised of 80 non diabetic individuals (40 males and 40 females). Informed and written consent along with demographic information was obtained from all participants of both groups. An inclusion criterion was designed for experimental group and control group. Also diabetic complications were taken into consideration. Following study tools include Hospital Anxiety and Depression scale (HAD-S), Patient Health Questionnaire (PHQ-9), World Health Organization (WHO – 5 and WHO Quality of life Brief (WHO – QOL BREF). Data was entered and analyzed on SPSS version 14.

Results: Findings of the study reveals that Psychiatric co morbidity is common among patients of T2DM compared with non diabetics. On HAD scale, mean score of anxiety in patients with Type 2 diabetes was 11.9 compared to non diabetics who showed 3.89. While mean score of depression was 15.54 in patients with type 2 diabetes and mean score of non diabetics was 6.70. Mean score of patients with Type 2 diabetes on WHO-5 was 29.38 and mean score of non diabetic was 75.9. On PHQ9 scale, patients with Type 2 diabetes scored mean of 16.21 and non diabetics had 4.78 mean score. Mean score showed by Type 2 diabetics was 48.13 compared to non diabetics whose mean score was 91.64. Depression and anxiety was more prevalent among males as per indicated by all scales administered. 65.4% T2DM showed poor metabolic control.

Conclusion: Findings of our study concluded the prevalence of high level of depression and anxiety among type 2 diabetics compared to non-diabetics. Co-morbid depression is significantly associated with higher HbA1c and increased age. The negative effect of depression on achieving good glycaemic control means that physicians need to screen for and manage this disorder to improve the quality of life of diabetes patients. It is therefore very important to make psychiatric assessment as part of initial evaluation in diabetic clinics so that these patients could take delivery of proper psychiatric management for improving their quality of life and decreasing the adverse results.

Key words: Psychiatric co morbidity, Type 2 Diabetes

Introduction

According to latest statistics 382 million people have diabetes in 2013; and by 2035 this will rise to 592 million. The number of people with type 2 diabetes is increasing in every country. 80% of people with diabetes live in low- and middle-income countries. The greatest

number of people with diabetes is between 40 and 59 years of age.¹

Systematic reviews and meta-analyses show association between diabetes and depression. The Studies indicate 11-30% of the diabetic population suffers from depression. It is a major public health issue as depression is generally associated with poor

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outcome of chronic illnesses including diabetes and contributes to the high economic burden of health care costs. It is suggested that vulnerability for depression is higher in those with diabetes than without diabetes. Evidence from developing countries also shows a significant association of diabetes with depression²

Both diabetes and anxiety/depression are associated with premature morbidity and mortality, and when these conditions co – exist, the risk of developing co – morbidities, complications, patient suffering and associated cost, escalates.³

Patients suffering from diabetes mellitus are also at a higher risk of being diagnosed with depression compared to normal population. This prevalence of depression among subjects with diabetes mellitus ranges from 12% to 28% in various studies.⁴

Depression in diabetes is associated with higher symptom burden, increased functional impairment, poor adherence to diet, exercise, poor compliance with medications and poor self-care. Severity of diabetes and depression is associated with impairment on many other dimensions of health related quality of life, including social functioning, cognitive functioning, role functioning, physical functioning, emotional well – being, perception of health and pain in general.

The World Health Organization report suggests that there will be more than 300 million people with diabetes by 2025 and most of these will be in the developing world. Pakistan is predicted to be the fourth most populous country for people with diabetes.⁵

It is essential for developing countries to rule out the prevalence of psychiatric co – morbidity among diabetic patients. In so doing early intervention can be done which can improve clinical outcome with better physical health and quality of life. Based on the above consideration, our study was aimed to evaluate association of Type 2 diabetes with psychiatric co morbidity. Objective of the study was to assess the prevalence of anxiety, depression and quality of life in patients with Type 2 diabetes attending the diabetic clinic of a tertiary care hospital.

Materials and Methods

The study was conducted in diabetic clinic of general medicine department of Pakistan Institute of Medical Science, Islamabad from Feb 2013 to April 2013. In this cross – sectional comparative study 52 type 2 diabetics (26 males and 26 females) were recruited. A randomly

selected control group (Non- diabetics) who volunteered themselves for lab screening for confirmation of not having diabetes was taken from various sectors of Islamabad. Inclusion criteria also included those with no family history of diabetes. For better comparative results number of control group was increased comprising of 80 individuals (40 males and 40 females). Their age was ranged from 15 years to 61+ years, education status was illiterate to above graduation and employment status was from unemployed (including students, non working people and house-wives). Monthly income was ranged from 10 thousand and above. Informed and written consent was obtained from all participants of both study group and control group. Inclusion criteria for experimental group were, Patients with Type 2 diabetes only, years of illness not less than a year and with latest Hb1Ac report. For both control and experimental groups demographic information was taken including age, education level, marital, socio economic and employment status, family history of diabetes. Co-morbidities if any like hypertension and stroke was noted. Also diabetic complications like neuropathy, retinopathy, nephropathy, diabetic foot were also taken into consideration. Reliable and validated study tools were used to assess depression, anxiety and quality of life of type 2 diabetics. These include: 1) Hospital Anxiety and Depression scale (HAD-S) was originally developed by Zigmond and Snaith (1983)⁶ and is commonly used by doctors to determine the levels of anxiety and depression that a patient is experiencing. The HADS is a fourteen item scale that generates ordinal data. Seven of the items relate to anxiety and seven relate to depression. Each item on the questionnaire is scored from 0-3 and this means that a person can score between 0 and 21 for either anxiety or depression. 2) Patient Health Questionnaire (PHQ-9) is the depression module, which scores each of the nine DSM-IV criteria as "0" (not at all) to "3" (nearly every day). It has been validated for use in primary care. Depression Severity: 0-4 none, 5-9 mild, 10-14 moderate, 15-19 moderately severe, 20-27 severe.⁷ World Health Organization (WHO – 5) The WHO-5 Well-Being Index is a five items questionnaire that measures current mental well-being with time frame of previous two weeks. Five items are rated on 6-point Likert scale. A score below 13 indicates poor well-being.⁸ The WHOQOL-BREF⁹ instrument comprises 26 items, which measure the following broad domains: physical health,

psychological health, social relationships, and environment.

For statistical analysis data was entered and analyzed on SPSS version 14. Variables were shown as Mean \pm SD and percentages. T-test and Pearson Correlation are used for age, years of illness, Anxiety, Depression, WHO-5 and PHQ-9.

Results

Result of the study reveals that Psychiatric co morbidity is common among patients of T2DM which affects their quality of life as well. Basic demographics for T2DM and healthy controls are shown in Table 1. Majority of participants were between age range of 46-60 years in both T2DM (40.4%) and healthy controls (35%) and were married with percentage of 82.7% in T2DM and 67.5% in control group. In T2DM 57.6% participants have completed their high schools while in control group 47.5% participants were qualified as graduated and above. In both groups majority of participants were unemployed i.e. 50% in T2DM and 52.5% in healthy controls as these include students, retired persons, house - wives and non-working persons. Majority of participant in both groups reported monthly income of above 20,000. As per inclusion criteria for healthy controls there were no family history of diabetes. 38.5% participants in T2DM patients had positive family history of diabetes, while 61.5% reported negative history. Bad control was shown by 65.4% T2DM patients on HB1Ac. In T2DM patients 73% showed no co morbidities, 25% were with hypertension and 1.9% had stroke. 51.9% T2DM patients had no diabetic complications, 3.8% showed diabetic neuropathy, 19.2% with retinopathy, 1.9% had nephropathy 7.7% had diabetic foot. 9.6% T2DM patients had both neuropathy and retinopathy, 1.9% had retinopathy and nephropathy, 1.9% showed retinopathy and diabetic foot, and 1.9% had nephropathy, retinopathy and nephropathy Table I.

Variables	Health Controls N=(80)%	DM patients N=52(%)
Gender		
Male	40 (50%)	26 (50%)
Female	40 (50%)	26 (50%)
Age Groups		
15-30 Years	26 (32.5%)	5 (9.6%)
31-45 Years	12 (15%)	14 (26.9%)
46-60 Years	28 (35%)	21 (40.4%)
61 + Years	14 (17.5%)	12 (23.1%)
Age (Mean \pm SD)	44.4 \pm 16.0	50.2 \pm 13.4
Marital Status		
Single	18 (22.5%)	4 (7.7%)

Married	54 (67.5%)	43 (82.7%)
Divorced	0 (0%)	1 (1.9%)
Widow	8 (10%)	4 (7.7%)
Education Status		
Un-educated	14 (17.6%)	15 (28.8%)
High School	28 (35.0%)	30 (57.6%)
Graduation and above	38 (47.5%)	7 (13.4%)
Employment Status		
Un-Employment	42 (52.5%)	26 (50%)
Employment	26 (32.5%)	23 (44.2%)
Retired	12 (15%)	3 (5.8%)
Monthly Income		
10 K – 20 K	31 (38.7%)	17 (32.6%)
Above 20 K	49 (61.3%)	35 (67.3%)
DM Family History		
Positive FH	0	20 (38.5%)
Negative FH	80 (100%)	42 (61.5%)
HB1AC		
Good Control	-	14(26.9%)
Border line	-	3 (5.8%)
Bad Control	-	34 (65.4%)
Co-Morbidities		
No Co-morbidity	80 (100)	38 (73%)
Hypertension	0 (0%)	13 (25%)
Stroke	0 (0%)	1 (1.9%)
Complications		
No complication	80 (100%)	27(51.9%)
Diabetic Neuropathy -1	-	2 (3.8%)
Diabetic Retinopathy -2	-	10 (19.2%)
Diabetic Nephropathy -3	-	1 (1.9)
Diabetic Foot - 4	-	4 (7.7%)
1,2	-	5 (9.6%)
2,3	-	1 (1.9%)
2,4	-	1 (1.9%)
1,2,3	-	1 (1.9%)

The results indicated that both DM patients and healthy control individuals are statistically different ($p < 0.01$). Table II shows that anxiety and depression level was higher in DM patients compared to normal individuals. Scores on HAD scale reveals anxiety as 11.9% and depression as 15.54% in T2DM patients. In contrast healthy controls showed 3.89% of anxiety and 6.70% of depression. The quality of life scale and WHO -5 also shown high scores for normal individuals compared to DM patients. As patients with T2DM scored lower to normality i.e. 29.38% on WHO-5 scale which depicts mental wellbeing also with poor score on quality of life scale that is 48.13%, while on WHO-5 healthy controls showed score of 75.9% and their quality of life score

Psychiatric Assessment (Mean \pm S.E.)	Normal Healthy Controls N=80	DM Patients N=52	p Value
Anxiety Score	3.89 \pm 0.47	11.9 \pm 0.62	$p < 0.01$
Depression Score	6.70 \pm 0.60	15.54 \pm 0.76	$p < 0.01$
WHO-5	75.9 \pm 2.61	29.38 \pm 3.48	$p < 0.01$
QoL Scale	91.64 \pm 1.62	48.13 \pm 1.62	$p < 0.01$
PHQ9 Scale	4.78 \pm 0.56	16.21 \pm 1.03	$p < 0.01$

was 91.6%. The scoring system for PHQ9 is opposite to WHO5 i.e. lower PHQ9 score depicts more healthy mental health. PHQ9 score of T2DM patients was 16.2% while score of healthy controls were 4.78%.

Table III shows gender wise distribution of anxiety and depression among T2DM patients and healthy controls. Results indicate that men in both groups showed more anxiety and depression compared to females while in control group female showed more depression. In T2DM patients 73.1% men and 53.8% female showed anxiety while 65.3% males and 42.3% females showed depression. In control group 7.5% females and 10% males showed anxiety and 17.5% men showed

depression compared to 20% females Table III. In table IV and V, correlations between various variables are shown for T2DM patients and of healthy controls. It was seen that in patients group, anxiety and depression increases with increasing age, while quality of life is also decreasing, a phenomenon being observed by negative correlation with WHO5 and QoL scale score. Also years of illness are inversely proportional to quality of life scale i.e. significant negative correlation Table4. In healthy control group, age is positively correlated with WHO5 and QoL scale score significantly. Anxiety and depression are significantly negatively correlated with WHO5 and QoL scale score and are in accordance to

Table III: Gender wise distribution of anxiety and depression among diabetic and non-diabetic individuals on various psychological scales

Psychological Scale	Healthy Controls N = 80		DM patients N = 52	
	Female N=40	Male N= 40	Female N = 26	Male = 26
HAD-5 Anxiety Score				
Non –Case (0-7)	34 (85 %)	32 (80 %)	6 (23.1 %)	3 (11.5 %)
Border line anxiety (8-10)	3 (7.5%)	4 (10%)	6 (23.1%)	4 (15.4 %)
Case of Anxiety (11+)	3 (7.5%)	4 (10%)	14 (53.8%)	19 (73.1%)
Depression Score				
Non –Case (0-7)	20 (50%)	27 (67.5%)	10 (38.4%)	3 (11.5%)
Border line depression(8-10)	12 (30%)	6 (15%)	5 (19.2 %)	7 (26.9 %)
Case of Depression (11+)	8 (20%)	7(17.5%)	11 (42.3 %)	17 (65.3 %)
PHQ9 Score				
Non –Case (0-4)	24 (60 %)	26 (65%)	5 (19.2 %)	2 (7.7%)
Mild Depression (5-9)	11 (27.5%)	8 (20%)	6 (23.0 %)	3 (11.5 %)
Moderate Depression (10-14)	3 (7.5%)	3 (7.5%)	4 (15.3 %)	5 (19.2 %)
Moderate Severe Depression (14-19)	1 (2.5%)	2(5.0%)	2 (7.7 %)	5 (19.2%)
Severe Depression (20-27)	1 (2.5%)	1 (2.5%)	9 (34.6 %)	11 (42.3 %)
WHOS Score				
Non –Case (>52)	32 (80%)	34 (85%)	15 (57.7 %)	9 (34.6 %)
Depression Case (<52)	8 (20%)	6 (15 %)	11 (42.3 %)	17 (65.4%)

Table IV: Dis Status = DM patients Correlations (a)

		AGE	Year Illness	HB1AC	Anxiety	Depression	WHO-5
AGE	Pearson Correlation	1	.550(**)	.228	.421(**)	.438(**)	-.315(*)
	Sig. (2-tailed)		.000	.108	.002	.001	.023
	N	52	52	51	52	52	52
DM Age of Onset	Pearson Correlation	.462(**)	-.487(**)	.165	.305(*)	.194	-.068
	Sig. (2-tailed)	.001	.000	.249	.028	.169	.631
	N	52	52	51	52	52	52
Year Illness	Pearson Correlation	.550(**)	1	.060	.129	.250	-.252
	Sig. (2-tailed)	.000		.674	.362	.074	.072
	N	52	52	51	52	52	52
HB1AC	Pearson Correlation	.228	.060	1	.313(*)	.237	-.235
	Sig. (2-tailed)	.108	.674		.025	.093	.096
	N	51	51	51	51	51	51
Anxiety	Pearson Correlation	.421(**)	.129	.313(*)	1	.739(**)	-.690(**)
	Sig. (2-tailed)	.002	.362	.025		.000	.000
	N	52	52	51	52	52	52
Depression	Pearson Correlation	.438(**)	.250	.237	.739(**)	1	-.773(**)
	Sig. (2-tailed)	.001	.074	.093	.000		.000
	N	52	52	51	52	52	52
WHO-5	Pearson Correlation	-.315(*)	-.252	-.235	-.690(**)	-.773(**)	1
	Sig. (2-tailed)	.023	.072	.096	.000	.000	

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed)

a Dis Status = 1 (In patients group, anxiety and depression increases with increasing age. Similarly, in patients years of illness is inversely proportional to quality of life scale score i.e. significant negative correlation)

our assumption that both depression and anxiety decrease quality of life Table V

Discussion

The association between diabetes mellitus and depression remain the focus of many researches and meta-analysis at local and international forums. Results of our study proved that Psychiatric co morbidity is common among patients of T2DM which affects their quality of life as well.

Karachi had depression.³ Our study also correlates with a study by Raval et al (2010) that more than one third of patients with T2DM were ailing from moderate to severe depression. Studies from USA and UK reported the prevalence of depression in patients with T2DM varying from 30 to 83 percent¹⁰ A small study from Iran reported 55 per cent prevalence of depression in patients with T2DM25. Similarly, a meta-analysis by Mosaku K *et al* identified the prevalence of depression in diabetes

Table V: Dis Status = Normal Healthy Individuals

		AGE	Anxiety	Depression	WHO-5	QOL Scale	PHQ-9
AGE	Pearson Correlation	1	.176	.066	.210	.380(**)	-.055
	Sig. (2-tailed)		.119	.561	.061	.001	.627
	N	80	80	80	80	80	80
Anxiety	Pearson Correlation	.176	1	.566(**)	-.396(**)	-.299(**)	.556(**)
	Sig. (2-tailed)	.119		.000	.000	.007	.000
	N	80	80	80	80	80	80
Depression	Pearson Correlation	.066	.566(**)	1	-.510(**)	-.319(**)	.730(**)
	Sig. (2-tailed)	.561	.000		.000	.004	.000
	N	80	80	80	80	80	80
WHO-5	Pearson Correlation	.210	-.396(**)	-.510(**)	1	.591(**)	-.636(**)
	Sig. (2-tailed)	.061	.000	.000		.000	.000
	N	80	80	80	80	80	80
QOL Scale	Pearson Correlation	.380(**)	-.299(**)	-.319(**)	.591(**)	1	-.492(**)
	Sig. (2-tailed)	.001	.007	.004	.000		.000
	N	80	80	80	80	80	80
PHQ-9	Pearson Correlation	-.055	.556(**)	.730(**)	-.636(**)	-.492(**)	1
	Sig. (2-tailed)	.627	.000	.000	.000	.000	
	N	80	80	80	80	80	80

Among normal healthy individuals, age is positively correlated with WHO5 and QoLscale score significantly. Anxiety and depression are significantly negatively correlated with WHO5 and QoL Scale score and are in accordance our assumption that both depression and anxiety decrease quality of life.

Our results correlate with a previous study from primary care clinics in Karachi that the patients with diabetes who have depression reported higher social stress, poorer health related quality of life compared to non depressed diabetic patients.⁵ Mean score of anxiety was 11.9 compared to control group where it was 3.89, depression mean was 15.54 which is very high as compared to healthy control 6.70. WHO -5 mean score was 29.38 in T2DM while control group mean was 75.9, Quality of life mean was 91.4 in healthy control while T2DM mean score is very low that is 48.13. Mean score of PHQ9 Scale was 16.21 while healthy control mean was 4.78, Table 1. Similar results were also found in previous local studies in which diabetic patients were compared with non – diabetic controls, and included 50 Or fewer patients in each group. Depression was found in greater proportion in the diabetic groups than non diabetics in both studies. Khuwaja et al (2010) showed that 43.5% of patients attending diabetic clinics in

ranging from 8 to 61 percent.¹¹

52 patients with Type 2 diabetes were included in the study with equal number of males and females (26 each). The mean age of control group was 44.4 ± 16.0 and 50.2 ± 13.4 was of study group. Table 2 showed basic demographics.

In patients group, anxiety and depression increases with increasing age, while quality of life is also decreasing, a phenomenon being observed by negative correlation with WHO5 and QOL scale score. Our findings are similar with results of study conducted in India, which reported that likelihood of depression was significantly higher with age.¹⁰ Researchers reported^{12,13}, a significant association of age with depression and other psychological disorders. This study also showed increased age as an independent factor for depression. It is well reported that older patients face many challenges including isolation, more diseases and disabilities; hence making them more prone to

developing psychological conditions.¹⁴ Our study showed in patient's years of illness is inversely proportional to quality of life scale score i.e. significant negative correlation. Likewise, duration of diabetes is also associated with development of depression in this study and has been reported by other researchers as well.¹⁵ Increased duration of the disease is known to significantly increase the risk of developing diabetic complications and health care expenditures, as a result such patients are more prone to develop psychological illnesses.³

Results depicted that 25% Type 2 diabetic patients had co morbid hypertension and only 1.9% had stroke. Among diabetic complications, majority (51.9 %) had no complications 19.2% had diabetic retinopathy, 9.6% had both neuropathy and retinopathy. 7.7% reported diabetic foot and only 1.9% had nephropathy. It is very important to note here as in our study group psychiatric co morbidity is high so this can raise the incidence of diabetic complications. It is therefore suggested that in diabetic clinics there should be a proper monitoring of glycemic control and depression. A large prospective study among type 2 patients found an increased risk of complications in the presence of depression.¹⁶ A study indicated that depression was higher in patients with diabetes-related complications such as renal, cerebrovascular, cardiac and neuropathic and ophthalmic⁶) Family history of diabetes was more common among healthy control (46%) compared to DM patients, which was 38.5%. There were found to have 26.9% good metabolic control, 65.4% showed bad control and 5.8% gave borderline results on Hb1Ac test. Good metabolic control was defined as per the standards given by the American Diabetes Association in 2011. As majority of T2DM patients demonstrated bad control so this can be the consequences of depression, anxiety and poor quality of life. In the same way depression, anxiety and poor quality of life can result in to bad metabolic control. This was consistent with findings in other studies where authors have found an impact of co-morbid depression on glycemic control in diabetes. Skaff *et al.* after evaluating 206 patients showed that mood changes were acutely associated with higher blood glucose value. In their study, a daily negative mood was associated with high fasting blood glucose values the very next day ($r = 0.17$; $P < 0.05$).¹⁷ A prospective study done by Eren *et al.* on the clinical impact of depressive episodes on glycemic control showed that the number of depressive episodes

correlated with a higher HbA1c in a group of 104 Turkish patients with type 2 diabetes mellitus. Another longitudinal study done among American veterans by Richardson *et al.*, the authors observed a higher HbA1c among patients with depression at all-time points compared to patients without depression¹⁸ Table 2.

Findings of our study reveal frequency of depression and anxiety was higher in T2DM male patients compared to females of same group, Table 3. This is opposite to all previous researches and meta-analysis done at national and international levels where data showed higher rates of depression, anxiety and poor quality of life among T2DM females.^{3,19,20} The reason of males being more depressed, anxious and with poor quality of life can be related to following factors: as males are chief earner in our system and so when they are no more working and earning they can have more chances of developing depression. Age can be another causative factor very often. In retired males another problem which can lead to psychiatric co morbidity is lack of social activities. In all such cases, level of diabetes increases which can add to more chances of depression, anxiety and lower quality of life. Findings of a previous study suggests that depression was common in group of subjects who were non-earners, less educated and belonging to low income group. Along with these factors, diabetes and increasing age were also positively associated with depression; similar trend was also observed in a study from rural community of Pakistan. We also observed that dependent persons (non-earners) were more depressed than earners, as they were not contributing as income generating members of the family and might have a feeling of worthlessness leading to depression.¹⁶ In present study we report that patients with type 2 diabetes are at increased risk of developing depression. Contributing factors include age, male gender, bad metabolic control and diabetic complications.

Further work on this important area need to be done as detection of psychiatric problems at early stages can direct to timely treatment and a better quality of life in T2 DM patients. It is suggested that there should be psychological services in every diabetic clinic for psychotherapy and counseling of diabetic patients. This will be very helpful for diabetic patients and their caregivers.

Conclusion

Findings of our study concluded the prevalence of high level of depression and anxiety among type 2 diabetics compared to non-diabetics. Co-morbid depression is significantly associated with higher HbA1c and increased age. The negative effect of depression on achieving good glycaemic control means that physicians need to screen for and manage this disorder to improve the quality of life of diabetes patients. Early diagnosis of

depression and intervention in patients with type 2 diabetes mellitus makes metabolic control trouble free. The patients with diabetes who have depression reported higher social stress, poorer health related quality of life compared to the non-depressed diabetic patients. It is therefore very important to make psychiatric assessment as part of initial evaluation in diabetic clinics so that these patients could take delivery of proper psychiatric management for improving their quality of life and decreasing the adverse results.

The limitation of study is small sized sample, single diabetic center, study population was not homogenous, in that control age were lower with higher education status.

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