



# Health-Related Quality of Life Index in Diabetic Patients: A Comparative Study between Beta Blockers vs. Calcium Channel Blockers

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## Abstract

**Background:** HRQOL is a concept that covers a broad range of human experience. In the medical domain it denominates aspects of the health from the patient's point of view, and is expressed as "subjective health" or "functional status and wellbeing".

**Aim:** To study and confirm the association of various HRQOL indices which are altered due to either of the drugs BBs or CCBs.

**Material and Method:** After institutional ethics committee approval and obtaining written informed consent patients were divided into two groups. Group A BB (n=30) and Group B CCB (n=40). The present study was designed to compare various HRQOL indices which are altered due to BBs vs. CCBs as additional antihypertensive agents in diabetic patients. It was designed as an open-label parallel group comparative clinical study.

**Results:** At baseline, the values for both BB and CCB groups were more than 68 meaning reasonably good quality of life and these values were not statistically different with each other. With 35 weeks of treatment, VAS was increased in CCB group whereas it was decreased in BB group meaning that CCB improved the quality of life perception by patients themselves whereas it was worsened by BB. This difference was statistically significant. After 35 weeks of usage in type 2 DM patients, calcium channel blockers were shown to be associated with significantly lesser perception of pain by the patients in comparison to beta blockers.

**Conclusion:** CCB when added as additional antihypertensive to type 2 DM patients did not alter the patients' perception in the HRQOL EQ-5D domains of mobility, pain and anxiety/depression.

## Abbreviations

HRQOL: Health-Related Quality of Life Index; BB: Beta Blockers; CCB: Calcium Channel Blockers

## Introduction

Health-Related Quality of Life Index (HRQOL) represents the effect of an illness on a patient, as perceived by the patient, and yields complementary information to medical and epidemiological data. It is often used as an outcome measurement. HRQOL has also been characterized as "the ultimate goal of all health interventions" [1]. HRQOL is a concept that covers a broad range of human experience. In the medical domain it denominates aspects of the health from the patient's point of view, and is expressed as "subjective health" or "functional status and wellbeing". Measuring Health-Related Quality of Life (HRQOL) in type 2 DM is important for several reasons such as dietary restrictions, medication and the actual symptoms of the disease as well as comorbid conditions, all of which may lead to deteriorations in HRQOL. Moreover, the guidelines for treatment of type 2 DM emphasize that one of the primary objectives is to improve HRQOL [2]. This implies that HRQOL is increasingly used as an outcome measure to monitor the burden of DM on the population and the results of previous studies show that HRQOL is associated with duration of diabetes, age, female gender, diabetic complications, concomitant diseases and disease severity [3-6].

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**Table 1:** Comparison between effects of BBs vs. CCBs used as additional antihypertensives for 35 weeks on VAS of EQ-5D amongst type 2 DM patients.

VAS (max = 100)	BB group (mean ± SD) [n=30]	CCB group (mean ± SD) [n=40]	P value and significance <sup>*</sup>
Before treatment	68.17 ± 5.49	69.75 ± 8.32	0.342 (NS)
After treatment	63.67 ± 5.86	72.50 ± 5.43	<0.001(HS)
Diff VAS (data after 35 weeks of treatment -baseline data)	-4.50 ± 4.42	2.75 ± 4.52	<0.001(HS)

BB: Beta Blockers; CCB: Calcium Channel Blockers; SD: Standard Deviation; NS: Not Significant  $p>0.05$ ; S: Significant  $p<0.05$ ; HS: Highly Significant  $p<0.01$   
<sup>\*</sup>Student's unpaired t -test was used for testing the difference between the means. The threshold of statistical significance was set at p value <0.05

**Table 2:** Comparison between effects of BBs vs. CCBs used as additional antihypertensives for 35 weeks on different parameters of EQ-5D amongst type 2 DM patients.

EQ-5D	BB [n=30] at 35 weeks of treatment		CCB [n=40] at 35 weeks of treatment		P value and significance <sup>*</sup>
	Number Present (%)	Number Absent (%)	Number Present (%)	Number Absent (%)	
Mobility	22 (73.33)	8 (26.67)	21 (52.50)	19 (47.50)	0.271 (NS)
Pain	24 (80.0)	6 (20.0)	4 (10.0)	36 (90.0)	0.025 (S)
Anxiety/Depression	7 (23.33)	23 (76.67)	1 (2.50)	39 (97.50)	0.402 (NS)

<sup>\*</sup>2 sample proportion test was used for testing difference between the proportions  
 NS: Not Significant  $p>0.05$ ; S: Significant  $p<0.05$ ; HS: Highly Significant  $p<0.001$

**Table 3:** Effects of BB on three domains of EQ-5D at baseline and after 35 weeks.

EQ-5D Domain	DM patients on BB for 35 weeks (n=30)	
	Number of patients with no problems at baseline (%)	Number of patients with no problems at 35 weeks of drug usage (%)
Mobility	21 (70)	10 (33.3)
Pain	15 (50)	6 (20)
Anxiety/depression	27 (90)	24 (80)

Various domains of functioning and well-being contribute uniquely to overall HRQOL, implying that a multidimensional measurement approach is required. In light of this, the majority of quality of life studies involving diabetics have been performed using multidimensional assessment including physical, psychological, and social functioning and well-being. The two major approaches to measuring HRQOL are generic and disease-specific instruments, and the two have been compared [7], in diabetes patients and shown to demonstrate complementarity and provide different kinds of information, with the generic ones perhaps providing more information than their disease-specific counterparts [8].

The present study was planned to study and confirm the association of various HRQOL indices which are altered due to either of the drugs BBs or CCBs.

### EQ-5D

It provides a simple descriptive profile and a single index value for health status [9]. The EQ-5D self-reported questionnaire includes a Visual Analog Scale (VAS), which records the respondent's self-rated health status on a graduated (0 to 100) scale, with higher scores for higher HRQOL. It also includes the EQ-5D descriptive system, which comprises 5 dimensions of health: Mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. The VAS provides a direct valuation of the respondent's current state of health, whereas the descriptive system can be used as a health profile or converted into an index score representing a Von Neumann-Morgenstern utility value for current health [9]. The level of problem reported on each of the EQ-5D dimensions determines a unique health state. Health states are converted into a weighted health state index by applying scores from the EQ-5D preference weights elicited from population samples. These weights lie on a scale on which full health has a value of 1 and dead a value of 0 [10]. At present, the EQ-5D is the most widely used generic preference-based health status measure [11].

## Material and Method

The present study was designed to compare Health Related Quality of Life (HRQOL) index, in diabetic patients who required Beta Blockers (BBs) or Calcium Channel Blockers (CCBs) as additional antihypertensive agents. It was designed as an open-label parallel group comparative clinical study in medical Outpatient Department (OPD) of the tertiary care hospital from November 2017 to January 2019.

Type 2 DM patients who visited the medical OPD for their ailments and those who required additional antihypertensive over and above ACEIs/ARBs were screened and enrolled in the present study. Patients of either sex, aged 40 years to 69 years and diagnosed with type 2 diabetes mellitus and hypertension with poor control of blood pressure by drugs suppressing Renin Angiotensin System were included. Patients suffering from any malignancies, psychiatry disorders, HIV or any life-threatening condition were excluded from the study. Patients enrolled were assigned to BB group or CCB group at random when in need of an additional antihypertensive agent. The assignment of patients to BB/CCB group was based on the requirement as per existing protocol for management of diabetic patients with cardiovascular co-morbidity. Hence, the design of the present clinical study was quasi-interventional.

### Study questionnaire

Health related quality of life index using EQ-5D-VAS was carried out on all diabetic patients enrolled in the study. It was based on the patient's response to the questionnaire translated in the regional language as understood by them (appendix attached). Patients were interviewed using a standardized questionnaire and patients self-rated health status was recorded using self-rating VAS, which consist of a linear scale divided into intervals with fixed limit points (0 to 100). VAS value of 100 denotes best imaginable health status and 0 denotes worst. Patients estimate on the visual analogue scale reflected

**Table 4:** Wilcoxon sign rank test for BB group for three domains of EQ-5D at baseline versus after 35 weeks of drug usage.

		N	p-value
Mobility_AF -Mobility_BF	Negative Ranks	1	0.002(S)
	Positive Ranks	12	
	Ties	17	
	Total	30	
Pain_AF - Pain_BF	Negative Ranks	0	0.003(S)
	Positive Ranks	9	
	Ties	21	
	Total	30	
Anxiety/Depression_AF -Anxiety/Depression_BF	Negative Ranks	0	0.083(NS)
	Positive Ranks	3	
	Ties	27	
	Total	30	

BF: Before/baseline data; AF: after 35 weeks data

**Table 5:** Effects of CCB on three domains of EQ-5D at baseline and after 35 weeks.

EQ-5D Domain	Type 2 DM patients on CCB for 35 weeks (n=40)	
	Number of patients with no problems at baseline (%)	Number of patients with no problems at 35 weeks of drug usage (%)
Mobility	21 (52.5)	19 (47.5)
Pain	34 (85)	36 (90)
Anxiety/depression	37 (92)	39 (97)

**Table 6:** Wilcoxon sign rank test for CCB group for three domains of EQ-5D at baseline vs. after 35 weeks of drug usage.

		N	p-value
Mobility_AF - Mobility_BF	Negative Ranks	3	0.317 (NS)
	Positive Ranks	1	
	Ties	36	
	Total	40	
Pain_AF - Pain_BF	Negative Ranks	1	0.317(NS)
	Positive Ranks	3	
	Ties	36	
	Total	40	
Anxiety Depression_AF - Anxiety Depression_BF	Negative Ranks	0	0.157(NS)
	Positive Ranks	2	
	Ties	38	
	Total	40	

BF: Before/baseline data; AF: after 35 weeks data

their self-assessment of quality of health. The EQ-5D form included domains of mobility, self-care, usual activities, pain, and anxiety/ depression. Patients were asked to tick whether they had no problems, some problems or severe problems in all these domains.

**Follow-up**

All of the above-mentioned base line data were repeated after 35 weeks of follow up period for each study group.

**Statistical analysis**

All the observations and findings were tabulated in individual tables. The results were analyzed statistically using suitable tests of significance. Data recorded were summarized as mean ± SD for continuous variables and percentages for categorical variables. The tests of statistical significance included students paired t test for testing the difference in means within groups and students unpaired t test for testing the difference in means between groups. Chi square

test of significance was used to study the difference in proportions between the groups. The threshold was set at p value <0.05 for statistical significance and p value <0.001 for highly significant levels.

**Results**

EQ-5D visual analogue score of value 100 denotes best quality of life. At baseline, the values for both BB and CCB groups were more than 68 meaning reasonably good quality of life and these values were not statistically different with each other. With 35 weeks of treatment, VAS was increased in CCB group whereas it was decreased in BB group meaning that CCB improved the quality of life perception by patients themselves whereas it was worsened by BB. This difference was statistically significant (Table1). After 35 weeks of usage in type 2 DM patients, calcium channel blockers were shown to be associated with significantly lesser perception of pain by the patients in comparison to beta blockers. As regards the domains of mobility and anxiety/

depression of EQ-5D, there were no significant differences between 35 weeks usage of CCBs or BBs as additional antihypertensives (Table 2). Within the group of type 2 DM patients treated with beta blockers as additional antihypertensives for 35 weeks, there was a significant worsening in the HRQOL EQ-5D domains of mobility and pain perceived by the patients. Beta blockers did not alter the anxiety/depression domains of EQ-5D (Table 3 and 4). Calcium channel blockers when added as additional antihypertensives to type 2 DM patients did not alter the patient's perception in the HRQOL EQ-5D domains of mobility, pain and anxiety/ depression (Table 5 and 6).

## Discussion

In the present study, we have attempted to compare beta blockers versus calcium channel blockers in respect of HRQOL index, when used as add on antihypertensive agents in diabetic patients.

In a cohort study on COPD patients, beta blockers had no material impact on the HRQOL of patients with peripheral arterial disease using SF-36 questionnaire [12]. In a review on the effect of beta blockers on HRQOL in patients with heart failure, few reported improvements in scores based on questionnaire on multiple domains while substantial improvements were observed by patients and physicians if a single question global assessment was used [13].

## Conclusion

In the present study, the addition of CCBs to ACEI s/ARBs did not alter HRQOL EQ-5D domains of mobility, pain and anxiety/depression making them neutral on patient's perception of quality of life indices. Beta blockers, in the present study, was shown to worsen domains of mobility and pain but did not aggravate depression, possibly due to diabetes already being more than four years duration when drugs were started and patients would have accepted the disease by then. When the single index of VAS in EQ-5D is compared, the negative effects of beta blockers is highly significant and CCBs stand out as a better choice as perceived by the patients. In the present study, the VAS score was comparable in both groups at baseline but whereas CCBs improved it, BBs worsened the score in 35 weeks.

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