

# Health-Related Quality of Life Among Liver Disorder Patients in Northern India

Yashika Chugh, Swati Katoch, Deepshikha Sharma, Pankaj Bahuguna, Ajay Duseja<sup>1</sup>, Manmeet Kaur, Radha Krishan Dhiman<sup>2</sup>, Shankar Prinja

Departments of Community Medicine and School of Public Health and <sup>1</sup>Hepatology, Postgraduate Institute of Medical Education and Research, Chandigarh,

<sup>2</sup>Department of Hepatology, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

## Abstract

**Objective:** The present study aims to determine the health-related quality of life (HRQoL) among liver disorder patients being treated in tertiary care hospital in north India and exploration of factors affecting HRQoL. **Methodology:** The HRQoL was assessed among 230 patients visiting either the outpatient department (OPD) or those admitted in high dependency unit (HDU) or liver intensive care unit (ICU) using direct measuring tools such as Euro QoL five-dimension questionnaire (EQ-5D) and EQ visual analog scale. Multivariate regression was used to explore the factors influencing HRQoL. **Results:** Mean EQ-5D scores among chronic hepatitis and compensated cirrhosis patients were  $0.639 \pm 0.062$  and  $0.562 \pm 0.048$ , respectively. Among those who were admitted in the ICU or HDU, mean EQ-5D score was  $0.295 \pm 0.031$ . At discharge, this score improved significantly to  $0.445 \pm 0.055$  ( $P < 0.001$ ). The multivariate results implied that HRQoL was significantly better among patients with lower literacy level ( $P = 0.018$ ) and those treated in OPD settings ( $P < 0.001$ ). **Conclusion:** HRQoL is impaired among patients suffering from liver disorders specifically those admitted in ICU. Further, there is a need to generate more evidence to explore the impact of determinants and treatment-associated costs on the HRQoL.

**Keywords:** Chronic hepatitis, cirrhosis, EQ5D, liver disorders, quality of life, visual analogue scale

## INTRODUCTION

Globally, chronic liver disorders exhibit an upsurge over preceding years, constituting a wide gamut, varying from liver disorders owing to infection, alcohol consumption, and nonalcoholic fatty liver disorders.<sup>[1,2]</sup> Worldwide, around 2 million deaths per year are caused due to liver disease, of which, a million are attributed to complications of cirrhosis and the rest due to viral hepatitis and hepatocellular carcinoma.<sup>[1-4]</sup> Nonalcoholic fatty liver disease is the most common chronic liver disease round the world including India.<sup>[5,6]</sup> However, among patients with cirrhosis liver and acute-on-chronic liver failure, alcohol-associated liver disease is the most common cause, and among patients with hepatocellular carcinoma, viral hepatitis B and C virus infection is the most common cause in India.<sup>[7,8]</sup>

Past literature at global level reports deteriorated health-related quality of life (HRQoL) among liver disorder patients, especially among patients with advanced disease.<sup>[9,10]</sup> Further, the challenge of economic management in terms of cost of care

in intensive care unit (ICU), hospitalization, and assessment of cost-effectiveness of therapeutic interventions also generates the need for research-based evidence on costing and cost-effectiveness. Recently, Health Technology Assessment in India (HTAIn) has been set up under the Department of Health Research. This board is responsible for generating evidence related to clinical and cost-effectiveness, safety of medicines, devices, and health programs through HTA approach.<sup>[11]</sup> Therefore, these data generated pertaining to HRQoL will form a major input for conduct of such studies. Furthermore, many HTA studies conducted in India have used such data to inform evidence-based decision-making.<sup>[12-14]</sup> Nevertheless,

**Address for correspondence:** Dr. Shankar Prinja,  
Department of Community Medicine and School of Public Health,  
Postgraduate Institute of Medical Education and Research,  
Chandigarh, India.  
E-mail: shankarprinja@gmail.com

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**For reprints contact:** WKHLRPMedknow\_reprints@wolterskluwer.com

**How to cite this article:** Chugh Y, Katoch S, Sharma D, Bahuguna P, Duseja A, Kaur M, *et al.* Health-related quality of life among liver disorder patients in Northern India. *Indian J Community Med* 2022;47:76-81.

**Received:** 09-07-21, **Accepted:** 29-12-21, **Published:** 16-03-22

### Access this article online

Quick Response Code:



Website:  
www.ijcm.org.in

DOI:  
10.4103/ijcm.ijcm\_1033\_21

current surge in liver disorders in India calls for attention to HRQoL among liver disorder patients apart from assessing the morbidity and mortality burden.

### Health-related quality of life

World Health Organisation describes HRQoL as “an individual’s perception of their position in life, and in context of culture and value systems in which they live, and also in relation to their goals, expectations, standards, and concerns.”<sup>[15]</sup> It has gained importance in the field of hepatology lately owing to its potential to measure impact of the therapeutic treatment or preventive intervention.

HRQoL has been explored either through generic or specific instruments or a combination of both. Generic measurement scales such as Euro-QoL five dimensions questionnaire (EQ-5D), visual analog scale (VAS), time trade off (TTO), short form 36, and others illustrate an overview of physical, mental, and social aspects of health status. On the contrary, disease-specific scales in case of liver disorders such as chronic liver disease questionnaire; liver disease quality of life (LDQOL); short form LDQOL (SF-LDQOL); and liver disease symptom index are more specific exhibiting disease severity, clinical outcomes, and treatment impact on HRQoL.<sup>[16]</sup>

Keeping in mind, the paucity of literature pertaining to the HRQoL among patients being treated for liver disorders in India and the multidimensional concept of HRQoL, the current paper tries to determine the HRQoL of the patients being treated for liver disorder in a tertiary care hospital in North India through generic measures with exploration of the impact of determinants of HRQoL.

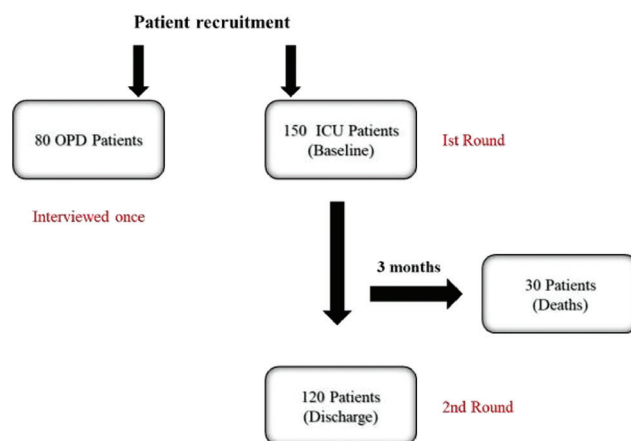
## METHODOLOGY

### Study setting

The study was conducted in a tertiary care hospital in North India with an annual attendance of 2,876,257 outpatients and 98,710 admissions in the year 2018–2019.<sup>[17]</sup> The study involved recruitment of patients of all ages visiting the liver outpatient department (OPD) as well as those admitted to specialized high dependency unit (HDU) or liver ICU for treatment of liver disorders.

### Data collection

A total of 230 patients with liver disorders were recruited. Considering the mean utility score of liver disorders as 0.736 with the SD of 0.259,<sup>[18]</sup> the anticipated difference in the utility score from the known population as 7%, Type I error as 0.05, and power of the study as 80%, a sample size of 199 was estimated, which was further adjusted for a loss to follow-up rate of 15%. For each stage, we adopted a consecutive sampling approach until we reached a total sample of 230 [Figure 1]. These patients were either hospitalized (ICU/HDU) or visited the OPD (chronic hepatitis/cirrhosis patients) for treatment. Irrespective of the etiology of liver disease, patients were divided into three categories



**Figure 1:** Flow of patients recruited in the study

of “chronic hepatitis,” “compensated cirrhosis,” and “ICU/HDU admissions.”

All the patients visiting the OPD setting were interviewed face to face by trained staff. For the patients admitted to the ICU or HDU, their attendants were interviewed at the time of admission (baseline) as well as at the time of discharge.

### Quality of life tools

To measure HRQoL, generic measures such as EQ-5D and EQVAS were used for interviewing the patients with liver disorders.

### Euro QoL five-dimension

EQ-5D is a generic direct questionnaire intending to cover the crucial aspects of health significant to patients along with the added benefit of comparison between different sets of population<sup>[19-22]</sup> consists of five attributes: mobility, self-care, usual activity, pain/discomfort, and anxiety/depression.<sup>[23,24]</sup> EQ-5D-5 L is used to produce a single utility score between <0 and 1 based on individuals’ responses to questions regarding the impact of liver disorders on their lives.<sup>[23]</sup> Utility score of “1” means perfect health and “0” implies death with a range of 1 to –0.549.<sup>[25,26]</sup>

Based on their valuations, algorithms are generated to estimate utility score for each state for the diseased person. In the current study, the reference population of Thailand, seen as a comparable health status country with India, was used for estimating the utility scores.<sup>[27]</sup>

### Euro QoL visual analogue scale

EQ VAS is another generic yet direct tool used to measure the preferences of individuals for health outcomes. Where an individual is asked to rate his present health state between 0 and 100,<sup>[28]</sup> with clearly defined end points labelled as “best imaginable health state” and “worst imaginable health stat.

### Statistical analysis

Descriptive analysis was undertaken to assess sociodemographic and clinical characteristics. For HRQoL estimation, mean utility scores were calculated separately for EQ-5D and

EQ-VAS along with 95% confidence intervals. To analyze the impact of social determinants<sup>[29]</sup> on HRQoL, a multivariate logistic regression was performed to assess the impact of independent variables: age, gender, marital status, education, occupation, and locality on the HRQoL among liver disorder patients, i.e., dependent variable.

### Ethical consideration

A written informed consent was obtained from the study participants or their caregiver in case of inability of the patient to give informed consent.

## RESULTS

### Sample characteristics

The majority of the patients were >50 years of age (41.7%), males (72.2%), and married (85.2%). Thirty (20%) out of 150 patients had mortality during their admission in liver ICU/HDU.

All the sample characteristics are described in Table 1.

### Quality of life scores

The mean EQ-5D score for forty chronic hepatitis patients was  $0.639 \pm 0.062$  and  $0.562 \pm 0.048$  for the forty patients with compensated cirrhosis. Among the 150 patients admitted to ICU/HDU, mean EQ-5D score of  $0.295 \pm 0.031$  was reported at the time of admission. At the time of discharge, this score improved significantly to  $0.445 \pm 0.055$  [Table 2].

However, at the time of discharge, only 120 patients could be administered the tool due to subsequent deaths. Further, EQ VAS was recorded with a mean score of  $73.750 \pm 4.759$  for chronic hepatitis patients,  $71 \pm 4.393$  for compensated cirrhosis patients, and  $45.90 \pm 3.124$  for patients admitted to ICU/HDU [Table 1].

### Determinants of health-related quality of life

The HRQoL significantly was better among patients aged <30 years in case of EQ-5D ( $P = 0.002$ ) and EQ VAS ( $P = 0.007$ ). Self-employed/salaried patients too had a better quality of life as compared to laborers and unemployed in case of both EQ-5D and EQ VAS ( $P < 0.001$ ). People residing rural/urban areas had a better quality of life as compared to those residing in slums in case of EQ VAS ( $P = 0.014$ ) [Table 1].

### Multivariate regression

The results implied that, after controlling for all the dependent variables, EQ-5D scores were significantly better among those treated in OPD setting as compared to those admitted in ICU/HDU ( $P < 0.001$ ). Similarly, EQ VAS scores were significantly better among illiterate ( $P = 0.009$ ) and those being treated in OPD settings ( $P < 0.001$ ) [Table 3].

## DISCUSSION

In view of the paucity of literature, the current study is the first of its kind which tried to explore quality of life among

**Table 1: Socio demographic and clinical profile of liver disorder patients**

Characteristics	Category	Number of patients, n (%)	EQ-5D score	P	VAS score	P
Age (years)	<30	46 (20)	0.49	0.002	63.67	0.007
	30-50	88 (38.3)	0.39		54.88	
	>50	96 (41.7)	0.32		51.30	
Gender	Male	166 (72.2)	0.38	0.933	54.79	0.721
	Female	64 (27.8)	0.38		55.93	
Marital status	Unmarried	34 (14.8)	0.69	0.010	77.77	0.068
	Married	196 (85.2)	0.57		70.80	
Education	Illiterate	18 (7.8)	0.43	0.126	56.11	0.573
	Up to middle (VIII)	72 (31.3)	0.42		57.32	
	Middle - secondary	75 (32.6)	0.32		52.37	
	Graduate or above	65 (28.3)	0.39		55.61	
Occupation	Labourer	16 (7.0)	0.11	<0.001	30.93	<0.001
	Self-employed	63 (27.4)	0.44		60.40	
	Unemployed	88 (38.3)	0.42		56.42	
	Salaried	63 (27.4)	0.35		54.22	
Locality	Urban	133 (57.8)	0.40	0.274	57.57	0.014
	Slum	11 (4.8)	0.35		50.01	
	Rural	86 (37.4)	0.44		64.54	
Admission	OPD	80 (34.8)	0.60	<0.001	72.37	<0.001
	ICU	150 (65.3)	0.27		45.90	
Disease category	Chronic hepatitis	40 (17.4)	0.64	<0.001	73.75	<0.001
	CC	40 (17.4)	0.56		71.01	
	ICU/HDU admissions	150 (65.2)	0.29		45.90	

OPD: Out-patient department, ICU: Intensive care unit, HDU: High dependency unit, CC: Compensated cirrhosis, VAS: Visual Analogue Scale, QoL: Quality of life, EQ-5D: Euro QoL five-dimension

**Table 2: Quality of life assessment of liver disorder patients (Euro QoL five-dimension)**

Quality of life assessment of liver disorder patients	Chronic hepatitis	CC	ICU/HDU admissions	
			Baseline	At discharge
Total (%)	40 (100)	40 (100)	150 (100)	120 (100)
Mean EQ5D score	0.64 (0.57-0.70)	0.56 (0.51-0.61)	0.29 (0.26-0.33)	0.44 (0.39-0.50)
Mobility				
Level 1	16 (40)	11 (27.5)	5 (3.3)	26 (21.7)
Level 2	20 (50)	22 (55)	33 (22.0)	60 (50.0)
Level 3	4 (10)	6 (15)	60 (40.0)	20 (16.7)
Level 4	0	1 (2.5)	39 (26.0)	5 (4.2)
Level 5	0	0	13 (8.7)	9 (7.5)
Self care				
Level 1	23 (57.5)	13 (32.5)	3 (2.0)	18 (15.0)
Level 2	16 (40)	26 (65)	31 (20.7)	63 (52.5)
Level 3	1 (2.5)	1 (2.5)	63 (42.0)	25 (20.8)
Level 4	0	0	43 (28.7)	5 (4.2)
Level 5	0	0	10 (6.7)	9 (7.5)
Usual activities				
Level 1	16 (40)	15 (37.5)	4 (2.7)	17 (14.2)
Level 2	19 (47.5)	19 (47.5)	34 (22.7)	52 (43.3)
Level 3	5 (12.5)	5 (12.5)	61 (40.7)	36 (30)
Level 4	0	1 (2.5)	38 (25.3)	6 (5)
Level 5	0	0	13 (8.7)	9 (7.5)
Pain and discomfort				
Level 1	9 (22.5)	6 (15)	4 (2.7)	46 (38.3)
Level 2	23 (57.5)	23 (57.5)	33 (22.0)	53 (44.2)
Level 3	8 (20)	11 (27.5)	58 (38.7)	9 (7.5)
Level 4	0	0	41 (27.3)	3 (2.5)
Level 5	0	0	14 (9.3)	9 (7.5)
Anxiety and depression				
Level 1	19 (47.5)	14 (35)	4 (27.0)	14 (11.7)
Level 2	20 (50)	23 (57.5)	30 (20.0)	60 (50)
Level 3	1 (2.5)	3 (7.5)	75 (50.0)	27 (22.5)
Level 4	0	0	30 (20.0)	10 (8.3)
Level 5	0	0	11 (7.3)	9 (7.5)

CC: Compensated cirrhosis, ICU: Intensive care unit, HDU: High dependency unit, QoL: Quality of life, EQ-5D: Euro QoL five-dimension,

chronic liver disorder patients with a generic tool. The results presented in this paper indicate severe impaired quality of life specifically among the ICU/HDU-admitted patients with a mean baseline EQ-5D score of  $0.295 \pm 0.031$  and EQ VAS score of  $45.90 \pm 3.124$  indicated below average quality of life.<sup>[30]</sup> Past evidence has also highlighted the impact of liver disorders on impaired quality of life.<sup>[31,32]</sup> This deterioration in the quality of life may be attributed to the severity of the liver disorders among those admitted in the ICU, with death as the final outcome among thirty patients at the time of discharge. However, the survivors after being treated in ICU, exhibited highly improved HRQoL as against the baseline state which was congruent with the findings in Morocco reporting a mean EQ VAS score of  $62 \pm 20$  and median EQ-5D index of  $0.52 (0.20-1)$ .<sup>[33]</sup> A systematic review and meta-analysis reports similar findings for the QoL among Hepatitis C patients. The patients with mild disease, i.e., chronic hepatitis, demonstrate an EQ-5D score in the range of  $0.77-0.87$  and  $0.55-0.77$  for compensated cirrhosis patients.<sup>[34]</sup>

### Exploration of methodological approaches

The outcome of HRQoL through various methodological approaches aid in exhibiting patient perspective, gains in health, and monitoring of clinical objectives. However, lack of any gold standard in measuring quality of life and usage of various methodological approaches leads to disparity among different scores.<sup>[35,36]</sup>

If seen individually, EQ-5D is a direct, short, and easy to use method for QALY calculation.<sup>[36]</sup> However, it is interpreted with an assumption of normality with a single score from aggregated numbers. For a person, for example, using wheelchair with severe grade in mobility cannot be given a better utility score than a person with mild problem. The former with a better social support may score better in the anxiety and depression as well as self-care domain as compared to the latter with weak social anchoring. Therefore, a single score derived from the aggregated score often can be misleading as it is unable to differentiate the different domains. Second,



**Table 3: Impact of various social determinants on Quality of life**

Variable	Beta	P	Lower limit	Upper limit
a. VAS				
Age	-1.798	0.259	-4.934	1.337
Gender	4.611	0.079	-0.541	9.762
Education	3.551	0.018	0.620	6.482
Occupation	2.405	0.072	-0.213	5.024
Locality	-0.520	0.802	-4.596	3.557
Admission	-29.438	0.000	-34.734	-24.143
b. EQ-5D				
Age	-0.038	0.061	-0.079	0.002
Gender	0.038	0.259	-0.028	0.104
Education	0.033	0.086	-0.005	0.071
Occupation	0.023	0.185	-0.011	0.056
Locality	0.002	0.954	-0.051	0.054
Admission	-0.353	0.000	-0.421	-0.284

VAS: Visual Analogue Scale, EQ-5D: Euro QoL five-dimension

the use of healthy population as a reference population for estimating utility scores for diseased states is another misnomer for interpreting the quality of life.

On the other hand, EQ VAS is a direct method based on respondent's perspective and represents patient's subjectivity where even marginal improvement is exhibited which a patient might hesitate in recording in EQ-5D. However, VAS lacks theoretical foundation and is unable to differentiate between temporary states and permanent disability.<sup>[37]</sup>

### Impact of socioeconomic determinants

The socioeconomic determinants also influence the way an individual ranks his/her quality of life. The past evidence shows mixed results with some studies indicating a lack of any association between socioeconomic determinants and HRQoL, whereas some indicating the contrary.<sup>[38-40]</sup> Few studies also reported a negative effect of these determinants on HRQoL and some reported only age as a relative factor impacting the quality of life.<sup>[39,40]</sup> In the current study at the baseline, both EQ-5D and EQ VAS demonstrated that quality of life was significantly deteriorated among the older age groups. Further, EQ VAS demonstrated that quality of life was better among patients living in rural areas as compared to those in urban areas as well as slums. Furthermore, salaried/employed patients had better quality of life. Quality of life was significantly better among the patients treated in OPD setting compared to patients admitted to the ICU. Furthermore, intensive care treatment resulted in improved HRQoL among survivors at discharge.

While controlling for the impact of various socio-economic determinants, estimates for EQ VAS scores implied that HRQoL was significantly better among illiterate ( $P = 0.018$ ) and patients being treated in OPD setting ( $P < 0.001$ ). Furthermore, while individually examining the impact of place of residence on quality of life, people living in rural areas imply significantly better HRQoL as compared to urban and slums. These findings are suggestive of the fact that patients with poor

educational status tend to rank their health better compared to literate patients in the same health state. These findings may be explained with the help of the concept of positional objectivity, which implies that people who are more educated and live in well-off areas are more conscious and aware about their health status.<sup>[41]</sup> Therefore, they are in a better position to apprise their health status as compared to their other counterparts, thus can bring forward even minor decrements in their HRQoL.

### Limitations

The tools we used were generic rather than disease specific which gave us an opportunity for wider comparability of results including those from different HTA studies for diverse disease conditions. Second, we did not use TTO which was originally developed as a tool that could produce comparable scores as to hypothetical choice between two alternatives for the patients. Owing to its hypothetical nature and complexity, we did not consider using this tool.<sup>[42]</sup> Third, for ICU patients, the HRQoL of life was estimated using caregiver responses which may not be as accurate. However, this was the only option available to record the preferences of these patients. Finally, we acknowledge that the sample sizes for estimating the utility values may not be large enough for different health states.

However, despite various studies in the past regarding reduction in HRQoL among chronic disorder patients, a crucial feature of exploring determinants or factors affecting quality of life was amiss in the previous studies which have been conducted in the current study using a generic tool.

### Policy implications and conclusion

HRQoL is severely impaired among patients suffering from chronic liver disorders requiring intensive care. However, keeping in mind the mortality attributed to liver disorders, the current study emphasises introduction of preventive as well as therapeutic interventions at earlier stages for curbing mortality as well as morbidity. Preventive measures such as risk reduction as well as lifestyle change will impact the quality of life positively. Further, there is a need to generate more evidence to explore the impact of determinants and treatment associated cost on HRQoL. Finally, there is a felt need for designing a gold standard for HRQoL assessment.

### Financial support and sponsorship

The study was funded by an intramural grant received from the Post Graduate Institute of Medical Education and Research, Chandigarh.

### Conflicts of interest

There are no conflicts of interest.

### REFERENCES

1. GBD 2017 Cirrhosis Collaborators. The global, regional, and national burden of cirrhosis by cause in 195 countries and territories, 1990-2017: A systematic analysis for the Global Burden of Disease Study 2017. *Lancet Gastroenterol Hepatol* 2020;5:245-66.
2. Asrani SK, Devarbhavi H, Eaton J, Kamath PS. Burden of liver diseases in the world. *J Hepatol* 2019;70:151-71.

3. Wiktor S, Hutin Y. The global burden of viral hepatitis: Better estimates to guide hepatitis elimination efforts. *Lancet* 2016;388:1030-1.
4. Jefferies M, Rauff B, Rashid H, Lam T, Rafiq S. Update on global epidemiology of viral hepatitis and preventive strategies. *World journal of clinical cases*. 2018;6:589.
5. Younossi ZM, Koenig AB, Abdelatif D, Fazel Y, Henry L, Wymer M. Global epidemiology of nonalcoholic fatty liver disease-meta-analytic assessment of prevalence, incidence, and outcomes. *Hepatology* 2016;64:73-84.
6. Duseja A, Najmy S, Sachdev S, Pal A, Sharma RR, Marwah N, *et al.* High prevalence of non-alcoholic fatty liver disease among healthy male blood donors of urban India. *JGH Open* 2019;3:133-9.
7. Mukherjee PS, Vishnubhatla S, Amarapurkar DN, Das K, Sood A, Chawla YK, *et al.* Etiology and mode of presentation of chronic liver diseases in India: A multi centric study. *PLoS One* 2017;12:e0187033.
8. Duseja A, Chawla YK, Dhiman RK, Kumar A, Choudhary N, Taneja S. Non-hepatic insults are common acute precipitants in patients with acute on chronic liver failure (ACLF). *Dig Dis Sci* 2010;55:3188-92.
9. Gutteling JJ, de Man RA, van der Plas SM, Schalm SW, Busschbach JJ, Darlington AS. Determinants of quality of life in chronic liver patients. *Aliment Pharmacol Ther* 2006;23:1629-35.
10. Afendy A, Kallman JB, Stepanova M, Younoszai Z, Aquino RD, Bianchi G, *et al.* Predictors of health-related quality of life in patients with chronic liver disease. *Aliment Pharmacol Ther* 2009;30:469-76.
11. Health Technology Assessment in India (HTAIn) – Health Technology Assessment in India (HTAIn); 2020. Available from: <https://hta.in/>. [Last accessed on 2020 Feb 08].
12. Bahuguna P, Prinja S, Lahariya C, Dhiman RK, Kumar MP, Sharma V, *et al.* Cost-effectiveness of therapeutic use of safety-engineered syringes in healthcare facilities in India. *Applied health economics and health policy*. 2019;1-9.
13. Jyani G, Prinja S, Ambekar A, Bahuguna P, Kumar R. Health impact and economic burden of alcohol consumption in India. *Int J Drug Policy* 2019;69:34-42.
14. Chugh Y, Dhiman RK, Premkumar M, Prinja S, Singh Grover G, Bahuguna P. Real-world cost-effectiveness of pan-genotypic sofosbuvir-velpatasvir combination versus genotype dependent directly acting anti-viral drugs for treatment of hepatitis C patients in the universal coverage scheme of Punjab state in India. *PLoS One* 2019;14:e0221769.
15. Srivastava S, Bhatia MS. Quality of life as an outcome measure in the treatment of alcohol dependence. *Ind Psychiatry J* 2013;22:41-6.
16. Orr JG, Homer T, Ternent L, Newton J, McNeil CJ, Hudson M, *et al.* Health related quality of life in people with advanced chronic liver disease. *J Hepatol* 2014;61:1158-65.
17. Postgraduate Institute of Medical Education and Research. 52<sup>nd</sup> Annual Report. Chandigarh: Ministry of Health & Family Welfare, Government of India; 2018-19.
18. Scalone L, Ciampichini R, Fagioli S, Gardini I, Fusco F, Gaeta L, *et al.* Comparing the performance of the standard EQ-5D 3L with the new version EQ-5D 5L in patients with chronic hepatic diseases. *Qual Life Res* 2013;22:1707-16.
19. Eddleston JM, White P, Guthrie E. Survival, morbidity, and quality of life after discharge from intensive care. *Crit Care Med* 2000;28:2293-9.
20. Graf J, Koch M, Dujardin R, Kersten A, Janssens U. Health-related quality of life before, 1 month after, and 9 months after intensive care in medical cardiovascular and pulmonary patients. *Crit Care Med* 2003;31:2163-9.
21. Capuzzo M, Bertacchini S, Davanzo E, Felisatti G, Paparella L, Tadini L, *et al.* Health-related quality of life before planned admission to intensive care: Memory over three and six months. *Health Qual Life Outcomes* 2010;8:103.
22. Sabbah I, Drouby N, Sabbah S, Retel-Rude N, Mercier M. Quality of life in rural and urban populations in Lebanon using SF-36 health survey. *Health Qual Life Outcomes* 2003;1:30.
23. Brooks R. EuroQol: The current state of play. *Health Policy* 1996;37:53-72.
24. Kind P. The EuroQol instrument: An index of health-related quality of life. In: Spiker B, editor. *Quality of Life and Pharmacoeconomics in Clinical Trials*. Philadelphia: Lippincott-Raven Publishers; 1996. p. 191-201.
25. Dolan P, Gudex C, Kind P, Williams A. The time trade-off method: Results from a general population study. *Health Econ* 1996;5:141-54.
26. Prieto L, Sacristán JA. What is the value of social values? The uselessness of assessing health-related quality of life through preference measures. *BMC Med Res Methodol* 2004;4:10.
27. Department of Health Research. *Health Technology Assessment in India*. New Delhi: Ministry of Health & Family Welfare, Government of India; 2018.
28. Rabin R, de Charro F. EQ-5D: A measure of health status from the EuroQol Group. *Ann Med* 2001;33:337-43.
29. About Social Determinants of Health. World Health Organization; 2020. Available from: [https://www.who.int/social\\_determinants/sdh\\_definition/en/](https://www.who.int/social_determinants/sdh_definition/en/). [Last accessed on 2020 Jul 08].
30. Björnsson E, Verbaan H, Oksanen A, Frydén A, Johansson J, Friberg S, *et al.* Health-related quality of life in patients with different stages of liver disease induced by hepatitis C. *Scand J Gastroenterol* 2009;44:878-87.
31. Khoufri I, Belayachi J, Dendane T, Abidi K, Madani N, Zekraoui A, *et al.* Measuring quality of life after intensive care using the Arabic version for morocco of the EuroQol 5 dimensions. *BMC Res Notes* 2012;5:56.
32. Buchanan-Hughes AM, Buti M, Hanman K, Langford B, Wright M, Eddowes LA. Health state utility values measured using the EuroQol 5-dimensions questionnaire in adults with chronic hepatitis C: A systematic literature review and meta-analysis. *Qual Life Res* 2019;28:297-319.
33. Parkin D, Devlin N. Is there a case for using visual analogue scale valuations in cost-utility analysis? *Health Econ* 2006;15:653-64.4.
34. Atiq M, Gill ML, Khokhar N. Quality of life assessment in Pakistani patients with chronic liver disease. *J Pak Med Assoc* 2004;54:113-5.
35. Younossi Z, Henry L. Overall health-related quality of life in patients with end-stage liver disease. *Clin Liver Dis (Hoboken)* 2015;6:9-14.
36. Fitzpatrick R, Fletcher A, Gore S, Jones D, Spiegelhalter D, Cox D. Quality of life measures in health care. I: Applications and issues in assessment. *BMJ* 1992;305:1074-7.
37. Awan MS, Waqas M, Ali M, Aslam MA. Status of health related quality of life between HBV and HCV patients of Pakistan. *Int J Bus Soc Sci* 2011;2:213-20.
38. Olson SH, Iyer S, Scott J, Erez O, Samuel S, Markovits T, *et al.* Cancer history and other personal factors affect quality of life in patients with hepatitis C. *Health Qual Life Outcomes* 2005;3:39.
39. Goins RT, John R, Hennessy CH, Denny CH, Buchwald D. Determinants of health-related quality of life among older American Indians and Alaska natives. *J Appl Gerontol* 2006;25:73S-88.
40. Lam ET, Lam CL, Lai CL, Yuen MF, Fong DY, So TM. Health-related quality of life of Southern Chinese with chronic hepatitis B infection. *Health Qual Life Outcomes* 2009;7:52.
41. Prinja S, Jeyashree K, Rana S, Sharma A, Kumar R. Wealth related inequalities in self reported morbidity: Positional objectivity or epidemiological transition? *Indian J Med Res* 2015;141:438-45.
42. Boye KS, Matza LS, Feeny DH, Johnston JA, Bowman L, Jordan JB. Challenges to time trade-off utility assessment methods: When should you consider alternative approaches? *Expert Rev Pharmacoecon Outcomes Res* 2014;14:437-50.