Journal of the Egyptian Society of Parasitology, Vol.43, No.1, April 2013
J. Egypt. Soc. Parasitol., 43(1), 2013: 183 – 194

IMPACT OF HEPATOCELLULAR CARCINOMA ON HEALTH RELATED QUALITY OF LIFE IN EGYPTIAN PATIENTS: A SINGLE CENTRE STUDY

By
HASSAN HAMDY, EMAN MAHMOUD FATHY BARAKAT AND RUNIA FOUAD EL FOLLY
Department of Tropical Medicine, Faculty of Medicine, Ain Shams University, Cairo 11341, Egypt
Correspondence: Dr. Runia El-Folly, runiaelfollytm@yahoo.com,

Abstract

Among patients with chronic liver disease, impairment in HRQOL has been reported. Hepatocellular carcinoma (HCC) is one of the major squeal of chronic liver diseases. So, relationship between subjective HRQOL and HCC must be analysed. This study assessed the effect of HCC on HRQOL, and its loco-regional treatment on HRQOL.

Forty patients with HCV related chronic liver disease as a control group was enrolled in the study. Eighty HCC patients on top of chronic HCV liver disease categorized according to the modality of loco-regional treatment (BCLC staging system) into GI; 40 HCC patients treated with radiofrequency ablation (RFA) and GII; 40 HCC patients treated with trans-arterial chemoembolization (TACE). The SF-36 questionnaire was performed before and one month after the intervention.

Comparing the parameters of HRQOL in GI before and after RFA, and in GII before and after TACE; there was a statistically significant improvement in group I. However, the improvement in group II (TACE) was non-significant (P>0.05).

Keywords: Hepatocellular carcinoma, Heath Related Quality of Life, Barcelona-Clinic Liver Cancer, Radiofrequency, Trans-arterial chemoembolization.

Introduction

Hepatocellular carcinoma (HCC), one of the major squeal of chronic liver diseases, is now increasing worldwide and the HRQOL of patients with HCC is an area of interest (Kondo *et al*, 2007). Incidence of HCC in Egypt is increasing, which may be the result of a shift in the relative importance of HBV and HCV as primary risk factors (Lehman and Wilson, 2009). El-Zayadi *et al.* (2006) found a remarkable increase of the proportion of HCC among CLD patients from 4% to 7.2% over a decade.

Relatively few studies assessed the value of HRQOL measurement in clinical practice. In the early stages of liver disease, patients show few or non-specific symptoms, therefore reporting less significant effects on HRQOL (Bianchia *et al*, 2003). HRQOL may

also be impaired because of the fear of disease progression and complications and finally by the burden of extrahepatic manifestations (Martin and Younossi, 2005).

The Short Form-36 (SF-36) health survey is a generic health status measurement consisting of 36 items in eight domains, which has demonstrated good reliability and validity in chronic disease populations, including those with chronic liver diseases (Fan *et al*, 2010)

This study aimed to assess the effect of hepatocellular carcinoma on health-related quality of life (HRQOL), as well as its locoregional treatment on health-related quality of life (HRQOL).

Patients, Materials and Methods

This controlled prospective study was performed from April 2010 till December 2011 in accordance with the ethical standards. Informed consent was obtained from all participants before enrolment.

Eighty patients with HCC on top of HCV related chronic liver disease were divided according to treatment modality into 2 groups: GI: 40 HCC patients treated by radiofrequency ablation (RFA). GII: 40 HCC patients treated by the trans-arterial chemoembolization (TACE). Also, 40 patients with HCV related chronic liver disease, without HCC matching with GI & GII regarding child classification were considered as control group (GIII).

All included patients had the clinical, biochemical and sonographic criteria of chronic liver disease as well as positive HCV antibody by 3rd generation ELISA (Wahib *et al*, 2005). HCC was diagnosed according to the algorithm of American Association for the study of liver diseases by both; high AFP> cut-off value (>200ng) and characteristic features of HCC by triphasic spiral abdominal CT (Bruix and Sherman, 2005).

Inclusion criteria: HCC patients that were fit for loco-regional treatment; Child-Pugh class A or B, prothrombin index >50%, platelet count >50000/ mm^3, ultrasound showing the lesion was suitable for percutaneous loco-regional ablation therapy (PLAT), no main portal vein involvement, no extrahepatic metastasis, no contraindication to both resection or liver transplantation or patient's refusal to undergo surgery. Patients were selected to the loco-regional modality according to the BCLC staging system for the HCC (Mangoud *et al*, 2004).

The tumour response was evaluated according complete response (CR): complete disappearance of all known disease and no new lesions; partial response (PR): at least 50% reduction in total tumour load of all measurable lesions; stable disease (ST): does not qualify for CR/PR or progressive disease; progressive disease (PD): at least 25% increase in size of one or more measurable lesions or the appearance of new lesions) modified according the EASL amendments that take into account the reduction in viable tumour volume due to TACE-induced necrosis (Hwang *et al*, 2013).

Exclusion criteria: HCC patients that were unfit for loco regional treatment; patients with other aetiologies for the

chronic liver diseases (HBV infection, auto-immune hepatitis, hemochromatosis, Wilson's disease or Budd-chiari syndrome), Child-Pugh class C, excessive bleeding tendency (platelet count < 50000 cells per mm^3 or prothrombin activity <50%), extrahepatic metastasis or vascular invasion, previous or simultaneous malignancies and other chronic illness (chronic heart disease, chronic pulmonary disease, history of cerebral vascular disease and diabetes mellitus). Patients refused to sign an informed consent were excluded.

All the enrolled patients were subjected to the following: a- Laboratory investigations including (alanine transaminases, aspartate transaminases, serum albumin, serum bilirubin (total and direct), international normalization ratio (INR), hepatitis markers (HCV antibody, hepatitis B surface antigen and hepatitis B core IgG) using third generation ELISA test, AFP using the one-step immune-enzymatic mediated assay). b- Imaging studies including chest X ray, abdominal ultrasonography and abdominal triphasic spiral CT (in patients with hepatic focal lesion(s)). c- Child-Pugh classification was done to all cases while the Okuda staging system was done to the HCC cases (Okuda *et al*, 1985). d- SF-36 questionnaires were performed before and one month after the intervention. The SF-36 composed of 36 questions, each of which was categorized into one of the eight domains: physical functioning, role limitation due to physical, body pain, general health, vitality, social functioning, role limitation due to emotional problem, and mental health.

All questions were scored on a scale from 0 to 100, with 100 representing the highest level of functioning possible. Aggregate scores were compiled as a percentage of total points possible, using the RAND scoring table (Ware and Sherboume, 1992).

Statistical analysis: Data were coded, tabulated, and statistically analysed using SPSS program (Statistical Package for Social Sciences) software version 18.0. Data were expressed as Mean ± standard deviation (SD) for quantitative measures and both number and percentage for categorized data. The following tests were used: independent t-test in cases of two independent groups with parametric data, paired t-test in cases of two independent groups with parametric data, Mann Whitney test in cases of two independent groups with non-parametric data and Wilcoxon signed rank test in cases of two dependent groups with non-parametric data and Chi square test for independent variables. While correlations were done using spearman correlation test for numerical non parametric and categorical data. Significance level (P) value was expressed as follows: $P > 0.05$ = Insignificant. $P < 0.05$ = Significant. $P < 0.01$ = High significant.

Results

The results are shown in tables (1, 2, 3 & 4).

Table 1: Demographic characteristics and laboratory data of studied groups:

variables	HCC G (No=80)	GIII (No=40)	t#	P- value
	Mean ± SD (Range)			
Age	51.8±6.2 (39.0-61.0)	50.0±5.6 (44.0-58.0)	1.547	>0.050
	N (%)	N (%)	χ^2 value&	P value
Sex: Male : Female	58 (72.5%) 22 (27.5%)	25 (62.5%) 15 (37.5%)	1.250	>0.050
Child: A : B	50 (62.5%) 30 (37.5%)	24 (60.0%) 16 (40.0)	0.071	>0.050
	Mean ± SD		t value#	P-value
Hb (12-16g/dl)	11.5±2.3	12.3±2.5	0.254	>0.050
WBC (14,000 cells/mm3)	3.9±0.9	4.2±0.7	1.846	>0.050
Platelets (148,000 cells/mm3)	115.2±32.4	121.5±21.3	1.114	>0.050
Albumin (3-5 mg/dl)	3.1±0.34	3.2±0.30	0.869	>0.050
INR (0.8-1.2)	1.9±0.2	1.1±0.1	23.81	<0.001
	Median (1st -3rd IQ)		Z-valueΩ	P-Value
ALT (up to 40 IU/L)	47.0 (30.7-85.7)	35.5 (28.3-41.7)	-3.571	<0.050
AST (up to 37 IU/L)	72.0 (43.5-102.0)	35.0 (30.3-41.7)	-3.771	<0.050
T. Billirubin (up to 1.2 mg/dl)	1.8 (1.0−1.5)	1.5 (1.3-1.8)	-0.754	>0.050
D. Billirubin (up to 0.3 mg/dl)	0.8 (0.4-0.8)	0.7 (0.5-1.0)	-1.302	>0.050
AFP (up to 10ng\ml)	26.9 (14.0-122.7)	2.0 (1.0-9.0)	-4.239	<0.001

INR; international normalization ratio, ALT; alanine transaminases, AST; aspartate transaminases, AFP; alpha-fetoprotein, #Independent t-test, Chi square test, Ω Mann Whitney test

Table 2: Health-related quality of life of GI (before & after intervention) and GIII:

Variables	GIII	GI before RFA	Z valueΩ	P value	GI after RFA	z valueΩ	P value
	Median (1st – 3rd IQ)				Median		
Physical function	97.5 (86.3-100.0)	75.0 (65.0-88.8)	-3.374	<0.001	85.0 (75.0-100.0)	-2.677	>0.050
Role limitation due to physical health	100.0 (50.0-100.0)	75.0 (25.0-100.0)	-1.217	>0.050	87.5 (0.0-100.0)	-0.765	>0.050
Role limitation due to emotional problem	88.3 (63.3-100.0)	50.0 (0.0-100.0)	-0.081	>0.050	83.3 (66.7-100.0)	-3.295	>0.050
Energy/ Fatigue	75.0 (70.0-33.8)	50.0 (41.3-55.0)	-3.278	<0.001	67.5 (65.0-75.0)	-1.574	>0.050
Emotional wellbeing	68.0 (61.0-76.0)	48.0 (36.0-56.0)	-0.974	>0.050	70.0 (64.0-76.0)	-0.469	>0.050
Social functioning	100.0 (75.0-100.0)	71.3 (65.0-90.0)	-1.801	>0.050	81.3 (75.0-100.0)	-1.875	>0.050
Pain	90.0 (78.1-90.0)	67.5 (55.6-80.0)	-2.739	<0.050	72.5 (77.5-97.5)	-0.790	<0.050
General health	75.0 (65.0-90.0)	40.0 (30.0-48.8)	-1.958	<0.050	60.0 (55.0-68.8)	-1.651	>0.050
Health change	50.0 (25.0-50.0)	25.0 (25.0-50.0)	-1.074	>0.050	50.0 (50.0-75.0)	-4.550	>0.050

Ω Mann Whitney test

Table 3: Health-related quality of life of GII (before then intervention) & GIII

Variables	GIII	GII before RFA	Z value$^{\Omega}$	P value	GII after RFA	z value$^{\Omega}$	P value
	Median (1st -3rd IQ)				Median		
Physical function	97.5 (86.3-100.0)	70.0 (63.0-88.0)	-1.225	<0.05	75.0 (65.0-98.0)	-2.051	<0.050
Role limitation due to physical health	100.0 (50.0-100.0)	71.0 (21.0–90.0)	-1.256	>0.050	75.0 (25.0-95.0)	-3.107	>0.050
Role limitation due to emotional problem	88.3 (63.3-100.0)	45.0 (5.0-80.0)	-1.168	>0.050	50.0 (15.0-80.0)	-0.844	>0.050
Energy/ Fatigue	75.0 (70.0-33.8)	55.0 (45.0-55.0)	-1.563	<0.05	65.0 (45.0-55.0)	-2.034	<0.050
Emotional wellbeing	68.0 (61.0-76.0)	60.0 (39.0-57.0)	-1.526	>0.050	65.0 (40.0-57.0)	-1.581	>0.050
Social functioning	100.0 (75.0-100.0)	65.0 (60.0-90.0)	-0.043	>0.050	70.0 (65.0-90.0)	-2.282	>0.050
Pain	90.0 (78.1-90.0)	67.5 (55.6–80.0)	-2.144	<0.05	70.5 (65.6-80.0)	-2.029	<0.050
General health	75.0 (65.0-90.0)	43.0 (30.0-48.0)	-1.997	<0.05	45.0 (35.0-48.0)	-2.754	<0.050
Health change	50.0 (25.0-50.0)	30.0 (25.0-50.0)	-0.274	>0.050	35.0 (20.0-50.0)	-2.516	>0.050

Ω Mann Whitney test

Table 4: Correlations between items of Health-related quality of life and other parameters:

HRQOL parameters	Before				After			
	GI		GII		GI		GII	
	r$^{\alpha}$	P	r$^{\alpha}$	p	r$^{\alpha}$	P	r$^{\alpha}$	P
Age	-0.535	<0.001	-0.383	<0.050	-0.408	<0.050	0.020	>0.050
Albumin	-0.155	>0.050	-0.059	>0.050	0.225	>0.050	0.330	<0.050
T. Billirubin	0.077	>0.050	-0.422	<0.050	-0.012	>0.050	-0.317	<0.050
D. Billirubin	-0.365	<0.050	-0.521	<0.001	-0.069	0.672	-0.337	<0.050
INR	-0.114	>0.050	0.140	>0.050	-0.389	<0.050	0.029	>0.050
AFP	0.102	>0.050	0.157	>0.050	-0.069	0.672	-0.337	<0.050

INR; international normalization ratio, AFP; alpha-fetoprotein, α Spearman correlation test
*Significant, *Highly Significant

Discussion

In the present study, both groups were matching regarding the age and sex (P>0.05). There was a statistically significant difference regarding INR, ALT and AST (P<0.05). As well as, a highly statistically significant difference regarding AFP (P<0.001) between HCC group and control group. Regarding the scoring systems of GI and GII of HCC patients, the 2 groups were matching regarding Child-Pugh classification and Okuda staging system (P>0.05). The majority of cases were

the Child A [68% and 65% for GI and GII, respectively, and Okuda 1 62.5% and 68% for GI and GII, respectively]. Regarding the response to intervention (RFA or TACE), there was no statistically significant difference between those who achieved complete response (70% and 55% of GI and GII, respectively) and those who achieved incomplete response (30% and 45% of GI and GII, respectively) ($P>0.05$).

The HRQOL was assessed in controls and HCC groups before and after intervention. Comparison between the HRQOL of them (before and after intervention) showed a highly statistical significant difference regarding physical function, energy/fatigue, pain and general health between GI (post-radio frequency) and control group ($P<0.05$). While after intervention; there was improvement in the previously affected four items in GI (post-radiofrequency), but without significant difference between them and GIII ($P>0.05$).

There was a statistical significant improvement in all items of HRQOL in the GI patients before and one month after intervention ($P<0.05$) (Fig. 1).

Comparison between HRQOL of GII (before intervention) and GIII, as well as (after intervention) and GIII, respectively showed a statistically significant difference regarding physical function, energy/fatigue, pain and general health between GII (post-chemoembolization) and GIII ($P<0.05$). While after intervention, the control group was still statistically better than GII (post-chemoembolization) in the previous affected four items of HRQOL; physical function, energy/fatigue, pain and general health ($P<0.05$). There was improvement in all items of HRQOL in HCC patients after chemoembolization (GII) but without statistically significant difference ($P>0.05$) in comparison to pre-intervention parameters (Fig. 2).

After the post-radiofrequency response (Fig. 3A), all items of HRQOL were significantly improved in those with complete response in comparison to those with incomplete response ($P<0.05$). But, post-chemoembolization response (Fig. 3B) showed improvement in HRQOL in patients with complete response in comparison to those with incomplete response but without significant difference ($P>0.05$).

By α Spearman correlation test, correlation between items of Health-related quality of life and other parameters; age, Hb, WBC, plat., ALT, AST, Albumin, T. bilirubin, D. bilirubin, INR and AFP, the serum albumin and bilirubin were the most significantly correlated to HRQOL parameters. As low serum albumin and high serum bilirubin lead to deterioration of the HRQOL parameters.

Generally speaking, the hepatocellular carcinoma (HCC) is one of the most common malignancies in the world (El-Serag, 2002). The largest concentration of patients is in Asia and sub-Saharan Africa (Parkin *et al*, 2005). Non-surgical treatment can prolong the survival period and palliate symptoms (El-Serag *et al*, 2008).

Given the time course of the disease and the burden of treatment, there are increasing concerns about the health-

related quality of life (HRQOL) associated with liver diseases and HCC. HCC has a great and potentially adverse impact on physical health and psychological well-being, and breaks the pattern of a patient's life. In addition to medical treatment and physical factors, psychosocial variables also play an important role in determining HRQOL (Lau and Lai, 2008).

Given the increasing numbers of patients with HCC and the potential value of assessing HRQOL, Fan & his colleagues reported a systematic review to identify the following: (1) generic and disease-specific measures used to assess HRQOL in patients with HCC; (2) HRQOL in patients with HCC compared with those with chronic liver disease and the general population; (3) effects of treatments on HRQOL: liver surgery, hepatic artery trans-catheter treatment, and radiotherapy; (4) relationships between physical variables, symptoms, and HRQOL; (5) relationships between demographic characteristics, psychological variables, and HRQOL and (6) effects of psychological interventions on HRQOL (Fan *et al*, 2010).

On the other hand, none of the available Egyptian studies had assessed the effect of HCC on the health-related quality of life (HRQOL). The present work was designed to assess the effect of hepatocellular carcinoma on the health-related quality of life (HRQOL), and its loco-regional treatment on the health-related quality of life (HRQOL).

The present results revealed that the parameters of health-related quality of life (HRQOL) in GI, physical function, energy/fatigue, pain and general health were significantly bad ($p<0.001$) than controls. While after radio frequency intervention; the previously mentioned four items of HRQOL were improved, but without a significant difference as compared to the controls. The present results were in accordance with previous studies which reported that HCC patients had worse HRQOL than those with chronic liver disease, especially in physical aspects. Compromised physical well-being might be a consequence of severe symptoms or treatment side effects, especially pain and fatigue (Lee *et al*, 2007).

The radiofrequency ablation (RFA) is established as the primary ablative modality for HCC, and accepted as the best therapeutic choice for patients with early-stage HCC when liver transplantation or surgical resection was not suitable options (Steel *et al*, 2007).

In the present study; comparing the parameters of HRQOL in GI (RFA-G) before and after intervention; all items of HRQOL were statistically improved by radiofrequency intervention, some parameters reached a significant difference ($P<0.001$) as physical function, energy/fatigue, pain and health change while others did not.

In randomized trials, Llovet *et al*. (2002) and Lo *et al.* (2002) considered that the trans-arterial chemoembolization (TACE) was the main stay of palliative therapy for HCC patients. The TACE offered a reasonable safe and efficacious palliative therapy for HCC.

The initial tumour size was an independent predictor of survival (Paul *et al*, 2011).

Regarding the health-related quality of life HRQOL in chemoembolization in the present study, physical function (P<0.050), energy/fatigue (P<0.001), pain and general health were statistically significant worsen (P<0.050) than controls. While after intervention, these four items of (HRQOL) were still statistically worse than those of controls. These data agreed with Arguedas *et al.* (2003) who showed that patients with better liver function, early stage of disease, and no recurrence have better HRQOL. Severe symptoms as pain and fatigue negatively correlated whereas performance status was positively correlated with HRQOL.

In the present series, comparing the HRQOL parameters in patients of GII (post-TACE) before and after intervention; all items were improved after intervention but without significant difference (P>0.05), not as those after radiofrequency intervention that agreed with Bielen *et al.* (2013) confirmed that HRQOL improvements were after liver surgery, hepatic artery trans-catheter treatment, and radiation therapy.

Regarding the response after intervention, the HRQOL was better in those with complete response [(70%) in GI and (55%) in GII] than incomplete response [(30%) in GI and (40%) in GII], which is logic as the tumour burden was reduced after intervention especially RFA which is a curative modality. Furthermore, this point needs to be more widely discussed in further Egyptian studies.

The present study showed that in GI and GII most of the HRQOL parameters were better in lower ages, higher serum albumin levels, and lower serum bilirubin levels, lower INR and with lower serum AFP levels. Shun *et al*. (2008) found that patients with higher albumin levels had better HRQOL and Kondo *et al*. (2007) confirmed that patients with lower serum bilirubin levels had better HRQOL. Besides, previous studies showed similar results to the present data (Mapes *et al*, 2004; Lipscomb *et al*, 2004; Wang *et al*, 2005; 2007; Lai *et al*, 2007; Mabrouk *et al*, 2012) showing that patients with better Child–Pugh classification had significant positive correlations with HRQOL and those with higher albumin levels had better HRQOL.

Conclusions

The outcome data showed that HCC patients had worse HRQOL than those with chronic liver disease, especially in physical aspects. Overall HRQOL was significantly improved after RFA and insignificantly improved after TACE.

In clinical practice, HRQOL prediction from variable objectives is necessary and may be useful. For that purpose, the relationship between subjective HRQOL scores and objective variables such as laboratory data, status of HCC, loco-regional treatment and post-treatment response is a must.

References

Arguedas, MR, DeLawrence, TG, Mc-Guire, BM, 2003: Influence of

hepatic encephalopathy on health-related quality of life in patients with cirrhosis. Dig. Dis. Sci. 48, 8:162206.

Bianchia, G, Loguerciob, C, Sgarbic, D, Abbiati, R, Brunetti, N, *et al*, 2003: Reduced quality of life of patients with hepatocellular carcinoma. Dig. Liver Dis. 35, 1:46-54.

Bielen, R, Verswijvel, G, Van der Speeten, K, 2013: Rhabdomyolysis after cytoreductive surgery and hyperthermic intraperitoneal chemotherapy: A case report. Case Rep. Oncol. 6, 1: 36-44.

Bruix, J, Sherman, M, 2005: Practice Guidelines Committee, American Association for the Study of Liver Diseases: Management of hepatocellular carcinoma. Hepatol. 42, 5:1208-36.

El-Serag, HB, 2002: Hepatocellular carcinoma: an epidemiologic view. J. Clin. Gastroenterol. 35, 5 2:S72-8.

El-Serag, HB, Marrero, JA, Rudolph, L, Reddy, KR, 2008: Diagnosis and treatment of Hepatocellular carcinoma. Gastroenterol. 134, 6:1752-63.

El-Zayadi, AR, Badran, HM, Barakat, EMF, Attia, Mel-D, Shawky, S, *et al,* 2005: Hepatocellular carcinoma in Egypt: A single centre study over a decade. World J. Gastroenterol. 11, 33: 5193-8.

Fan, SY, Eiser, C, Ho, MC, 2010: Health-related quality of life in patients with hepatocellular carcinoma: A systematic review. Clin. Gastroenterol. Hepatol. 8, 7:559-64.e1-10.

Hwang, SH, Yoo, MR, Park, CH, Jeon, TJ, Kim, SJ, 2013: Dynamic contrast-enhanced CT to assess metabolic **response** in patients with advanced non-small cell lung cancer and stable disease after chemotherapy or chemoradiotherapy. Eur. Radiol. 2013; Jan 9. [Epub ahead of print]

Kondo, Y, Yoshida, H, Tateishi, R, Shiina, S, Mine, N, *et al*, 2007: Health-related quality of life of chronic liver disease patients with and without hepato-cellular carcinoma. J. Gastroenterol. Hepatol. 22, 2:197-203.

Lai, H, Lin, SY, Yeh, SH, 2007: Exploring uncertainty, quality of life and related factors in patients with liver cancer, Chin. J. Nursing 54, 6:41-52

Lau, WY, Lai, EC, 2008: Hepatocellular carcinoma: current management and recent advances. Hepatobil. Pancreat. Dis. Int. 7, 3:237-57.

Lee, LJ, Chen, CH, Yao, G, Chung, CW, Sheu, JC, *et al*, 2007: Quality of life in patients with hepatocellular carcinoma received surgical resection. J. Surg. Oncol. 95, 1:34-9

Lehman, EM, Wilson, ML, 2009: Epidemiology of the hepatitis viruses among hepatocellular carcinoma cases and healthy people in Egypt: A systematic review and meta-analysis. Int. J. Cancer 124, 3:690-7.

Lipscomb, J, Donaldson, MS, Arora, NK, Brown, ML, Clauser, SB, *et al*, 2004: Cancer outcomes research. J. Natl. Cancer Inst. Monogr. 33:178-97.

Llovet, JM, Real, MI, Montaña, X, Planas, R, Coll, S, *et al*, 2002: Arterial embolisation or chemoembolisation versus symptomatic treatment in patients with unresectable hepatocellular-carcinoma: A randomised controlled

trial. Lancet 359: 1734-9.

Lo, CM, Ngan, H, Tso, WK, Liu, CL, Lam, CM, *et al*, 2002: Randomized con-trolled trial of transarterial lipiodol chemoembolization for unresectable hepato-cellular carcinoma. Hepatol. 35: 1164-71.

Mabrouk, M, Esmat, G, Yosry, A, El-Serafy, M, Doss, W, *et al*, 2012: Health-related quality of life in Egyptian patients after liver transplantation. Ann. Hepatol. 11, 6:882-90.

Mangoud, AM, Essa, MH, Sabee, EI, Ibrahem, IA, Ismail, A, Morsy, TA, *et al*, 2004: HCV and associated concomitant infections at Sharkia Governorate, Egypt. J. Egypt. Soc. Parasitol. 34, 1:S447-58.

Mapes, DL, Bragg-Gresham, JL, Bommer, J, Fukuhara, S, McKevitt, P, *et al*, 2004: Health-related quality of life in the Dialysis Outcomes and Practice Patterns Study (DOPPS). Am. J. Kidney Dis. 44, 5:S54-60.

Martin, LM, Younossi, ZM, 2005: Health-related quality of life (HRQL) in chronic liver disease. Dig. Liver Dis. 37, 11:819-20.

Okuda, K, Ohtsuki, T, Obata, H, Tomimatsu, M, Okazaki, N, *et al*, 1985: Nat-ural history of hepatocellular carcinoma and prognosis in relation to treatment: Study of 850 patients. Cancer 56, 4:918-28.

Parkin, DM, Bray, F, Ferlay, J, Pisani P, 2005: Global cancer statistics: 2002, CA Cancer. J. Clin. Cancer 55, 2:74-108.

Paul, SB, Gamanagatti, S, Sreenivas, V, Chandrashekhara, SH, Mukund, A, *et al*, 2011: Trans-arterial chemoembolization (TACE) in patients with unresectable hepatocellular carcinoma: Experience from a tertiary care centre in India. Intervent. Radiol. 2, 2:113-20.

Shun, SC, Chiou, JF, Lai, YH, Yu, P J, Wei, LL, *et al*, 2008: Changes in quality of life and its related factors in liver cancer patients receiving stereotactic radiation therapy. Support Care Cancer 16, 9:1059-65.

Steel, JL, Chopra, K, Olek, MC, Carr, BI, 2007: Health-related quality of life: hepatocellular carcinoma, chro-nic liver disease, and the general population. Qual. Life Res.16, 2:203-15.

Wang, YB, Chen, MH, Yan, K, Yang, W, Dai, Y, *et al,* 2005: Quality of life of primary hepatocellular carcinoma patients after radiofrequency ablation. Chin. J. Cancer 24, 7:827-33.

Wang, YB, Chen, MH, Yan, K, Yang, W, Dai, Y, *et al,* 2007: Quality of life after radiofrequency ablation combined with transcatheter arterial chemo-embolization for hepatocellular carcinoma: Comparison with transcatheter arterial chemoembolization alone. Qual. Life Res. 16, 3:389-97.

Ware, JE, Sherboume, CD, 1992: The MOS 36-item short form health survey (SF-36); Conceptual Framework and item selection. Med. Care 30:473-83.

Wahib, AA, Seif El Nasr, MS, Mangoud, AM, El Shazly, AM, Morsy, A TA, 2006: The liver function profile in PCR-RNA Egyptian HCV-patients & normal controls. J. Egypt. Soc. Parasitol. 35, 2:451-66.

Explanation of Figures

Fig. 1: Health-related quality of life of Group I before and after intervention.
Fig. 2: Health-related quality of life of Group II before and after intervention.
Fig. 3: Comparison between complete and incomplete response after intervention in GI (A) and GII (B).

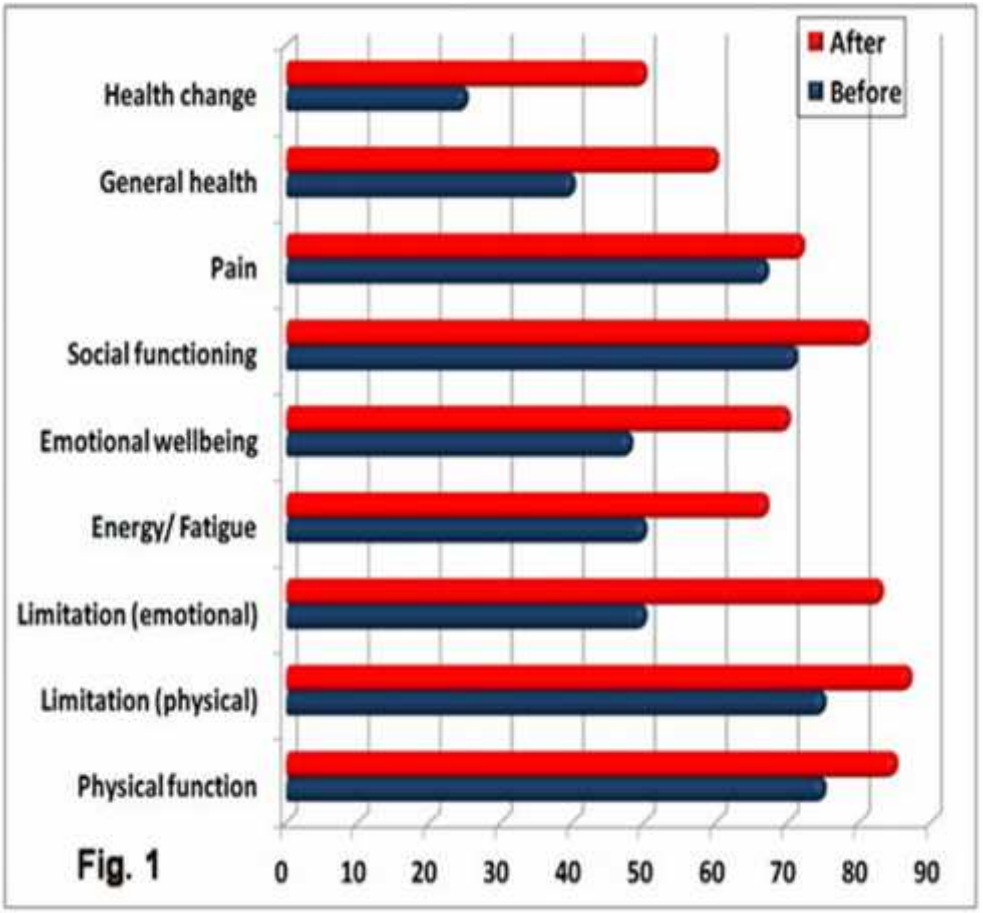

Fig. 1

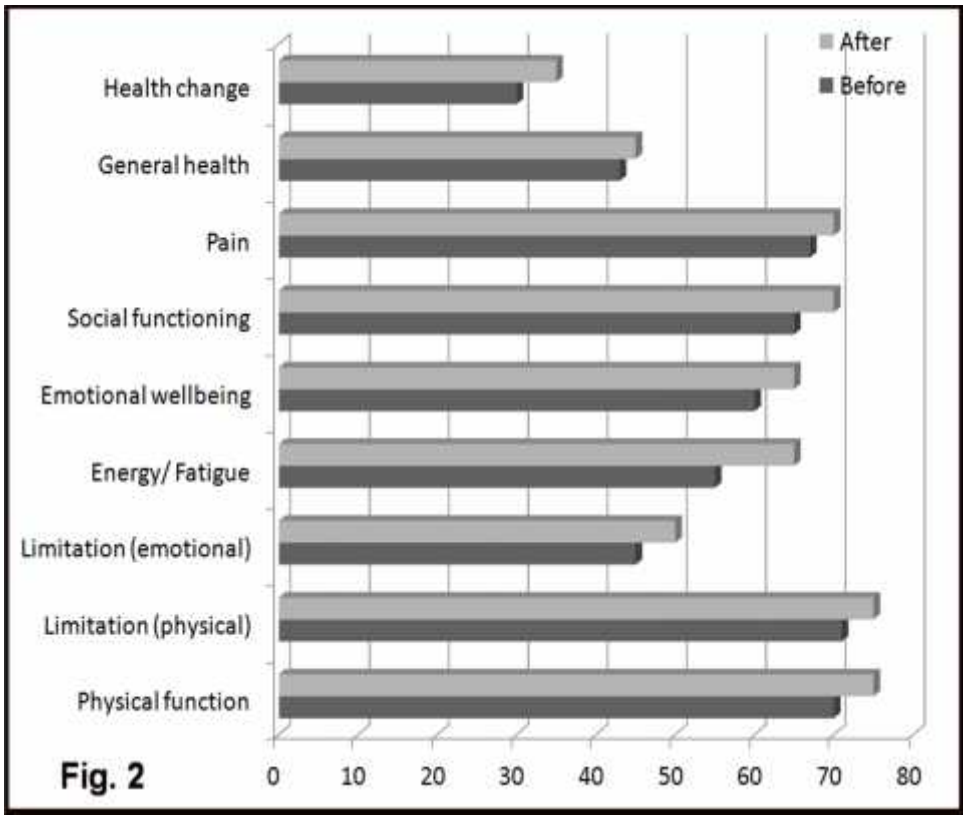
After
Before
Health change
General health
Pain
Social functioning
Emotional wellbeing
Energy/ Fatigue
Limitation (emotional)
Limitation (physical)
Physical function
0
10
20
30
40
50
60
70
80

Fig. 2

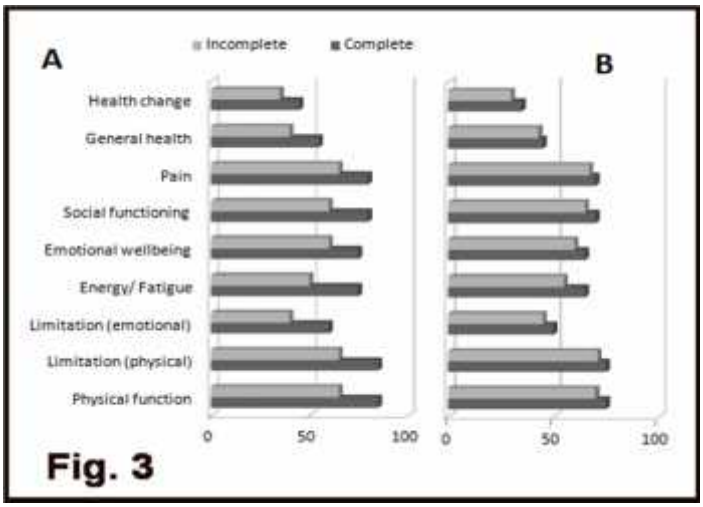
A
Incomplete
Complete
B
Health change
General health
Pain
Social functioning
Emotional wellbeing
Energy/ Fatigue
Limitation (emotional)
Limitation (physical)
Physical function
0
50
100
0
50
100

Fig. 3