

Symptomatology and health attitudes of chronic hepatitis B patients in the USA

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SUMMARY. This study was conducted to understand the symptomatology, attitudes, and behaviours of chronic hepatitis B (CHB) patients in the USA. CHB patients enrolled in this study were recruited through multiple methods, including newspaper advertisements. Interviews were conducted in multiple languages, and all participants had a history of CHB infection for at least 6 months. Patients with documented human immunodeficiency virus or hepatitis C virus coinfection were excluded from data analyses, resulting in a total study population of 258 respondents who completed interviews between April and June 2004. The majority of monoinfected patients were male (57%) and non-Asian (92%, including 52% Caucasian, 32% African American and others). Length of diagnosis was 5.8 years for all participants (9.1-year Asian and 5.1-year non-Asian). Ninety-five per cent of CHB patients reported symptoms of differing severity in the 12 months prior to the survey. The most common symptoms included fatigue/loss of energy

(90%) and loss of appetite (79%). Non-Asian patients described greater symptomatology, and were more likely than Asians to consider CHB an overriding concern in their daily activities. Patients were treated either currently or previously with interferon (IFN) described greater symptomatology than those treated without IFN. Survey results indicate that CHB patients may have greater symptomatology than recognized. Disease perceptions and treatment attitudes differ between Asian and non-Asian ethnic groups, with the former appearing to be more accepting and less concerned about the disease. Additional research about CHB symptomatology and health attitudes by ethnicity is needed to ensure that individuals with CHB are educated on the potential health risks and the availability of current treatment options.

Keywords: chronic hepatitis B, socio-economic, symptomatology, survey.

INTRODUCTION

Chronic hepatitis B (CHB) is associated with progressive liver disease, including cirrhosis, decompensated cirrhosis and hepatocellular carcinoma (HCC) [1,2]. End-stage liver disease resulting from CHB is associated with well-recognized clinical manifestations and costs to the US healthcare system. [3]. However, to date, the overall impact of CHB on quality of life, including health attitudes and symptomatology, has not been well described.

Abbreviations: API, Asian/Pacific Islander; CDC, Centers for Disease Control; CHB, chronic hepatitis B; HBV, hepatitis B virus; HCC, hepatocellular carcinoma; HCV, hepatitis C virus; HIV, human immunodeficiency virus; IFN, interferon.

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Approximately 12 million people (4.9%) have been exposed to/infected with hepatitis B virus (HBV) in the USA [4]. It is estimated that over half of the 1.25 million individuals with CHB in the US are Asian/Pacific Islander (API) Americans [4,5]. According to Centers for Disease Control (CDC) figures from 2002, the incidence of CHB is 7% among API Americans, compared with 0.1–0.5% among Caucasian, Hispanic and African-Americans. Furthermore, the incidence in foreign-born API Americans mirrors that in Asia-Pacific and sub-Saharan African countries (9% vs 10%, respectively), while that among US-born APIs is 1.4% [5]. These data suggest that Asian immigrants are disproportionately impacted by CHB in the USA.

The ultimate risk of disease progression in CHB patients is high. Up to 40% of infected patients will develop cirrhosis, liver failure or HCC [6]. Death from chronic liver disease occurs in 15–25% of CHB patients [7]. In contrast to the US pattern of transmission through infected needles and blood,

HBV in Asia is most commonly transmitted vertically, from mother to infant. Horizontal transmission within families also occurs in children under 10 years of age [8–10]. Thus, Asians with HBV infection usually acquire their infection at a much younger age and are therefore at much greater risk of developing long-term complications of the infection by the fourth or fifth decade of life, approximately 20 years earlier than American patients who usually do not acquire HBV until the second or third decade of life [11,12].

Despite the risk of disease progression, CHB is perceived as relatively asymptomatic in patients with compensated liver function. Whether the disease is truly asymptomatic or symptoms go unrecognized is not well described. According to the CDC, about 30% of HBV-infected persons have no overt signs or symptoms [7]. The Asian Liver Center at Stanford University and the Hepatitis B Foundation suggest this number may be even greater, with 69% of infected people experiencing no symptoms or having unrecognized symptoms. Hepatitis B is therefore frequently described as a 'silent infection'.

Quality of life data for CHB is scarce compared with other viral infections such as hepatitis C virus (HCV) and human immunodeficiency virus (HIV), with most studies being cross-sectional or small in numbers [13,14]. Kunkle *et al.* [15] observed that depression levels in a small group of 50 Korean American patients with CHB were positively correlated with liver enzyme levels. Additionally, a small community-based survey of 56 Korean Americans highlighted concerns such as misunderstanding HBV transmission and fear of stigmatization or ostracism that appeared to result in depression combined with chronic fatigue (Kim and Hann, pers. comm.). Given the high prevalence and mortality of hepatitis B infection, it is critical to better understand the symptomatology and impact of chronic HBV infection. This study employed a patient survey to assess symptomatology experienced by CHB patients in the USA, and to characterize patients' attitudes towards CHB and their general health.

METHODS

This was an industry-sponsored study that was conducted between April and June of 2004, and recruited self-identified patients in seven major US cities with a high prevalence of CHB. A history of CHB infection for at least 6 months was required to participate in the survey. A variety of recruitment approaches were employed, including physician-distributed postcards, advertisements in metropolitan newspapers and hepatitis-related Web sites, and flyers posted in shopping malls and other high-traffic locations. Surveys were translated into Spanish, Korean and Chinese. Study participants were remunerated equally for essentially an hour's worth of time. Participants were not aware that this was an industry-sponsored study; they were, however, aware that the study was being sponsored by a firm that was interested in understanding how people live with CHB. Study

sponsors adhered to the CASRO (Council of American Survey Research Organizations) privacy policy for protection of the participants' identity, and, per the policy guidelines, identity of the participants was not revealed to them.

The survey comprised 59 questions with fixed-response choices. Questions were categorized by demographics, current health status including symptomatology, attitudes towards overall health, attitudes towards hepatitis B and general lifestyle. Given the specific interest in understanding the symptomatology and attitudes towards CHB, patients with HIV coinfection or HCV coinfection were excluded from these analyses. Prior ribavirin use was considered to be indicative of HCV coinfection, and patients with a history of ribavirin use were excluded from this study. Based on self-reported diagnosis and treatment history, patients were stratified according to ethnicity (Asian vs non-Asian) and treatment status (never treated vs current or past treatment with interferon [IFN] vs current or past treatment without IFN). IFN use is associated with significant side effects, and patients were stratified by treatment status to understand the extent to which reported symptoms differ for patients treated with IFN vs those treated without IFN. Information about the patient's pre-treatment clinical condition, clinical response to therapy, medical history and concomitant illness was not collected.

Participants were asked to rate the severity of symptoms and impact of symptoms on daily life using a 5-point scale. This scale was generated from an exploratory qualitative research project with hepatitis B patients as well as industry-standard Likert scales for research projects. Conversations with patients suggested that the spectrum of symptoms ranged from a scale of frequency (how often a symptom is experienced) to severity and impact on life. With that knowledge, a 1–5 scale to denote breaks within this spectrum that is consistent with validated research methodologies was chosen [16]. Furthermore, a 5-point or odd-number scale was chosen to allow for a 'neutral' opinion.

Statistical comparisons were performed between subgroups of interest in a pairwise fashion and evaluated at the two-sided alpha level of 0.05 without adjustment for multiple comparisons. A chi-squared test was used for the analysis of difference in percentages. A *t*-test was used for the analysis of difference in mean scores between groups.

RESULTS

Demographic and background characteristics

A total of 376 patients with CHB completed the survey. Patients with documented HIV coinfection or with HCV coinfection including prior ribavirin use were excluded from the data analyses, resulting in a total study population of 258 respondents. Of these, the majority of patients were male (57%) and Caucasian (52%), with a median age of 43.8 years (Table 1).

	Total study population (n = 258)	Study population under MD care* (n = 138)	ISIS Hep B monitor (n = 700)
Gender, n (%)			
Male	148 (57)	79 (57)	(69)
Female	110 (43)	59 (43)	(31)
Mean (\pm SD) age, years	44 \pm 10	43 \pm 10	43 \pm 12
Race, n (%)			
Caucasian	133 (52)	87 (63)	(44)
African American	82 (32)	32 (23)	(24)
Asian	20 (8)	5 (4)	(26)
Other (incl. Hispanic)	23 (9)	14 (10)	(8)

*Under MD care = visits a physician every 6 months or more often for CHB; ISIS now called Synovate Healthcare.

With regard to gender and age, the study population was similar to that of the average US CHB patient, according to available data (ISIS Hep B Monitor). This study also recruited a similar proportion of Caucasian and African-American patients compared with that of the US CHB population, although a lower than expected number of Asian patients participated.

Stratification by ethnicity and treatment status

No significant demographic differences were observed among Caucasian, African-American or other patients; hence, these individuals were grouped together as non-Asian. Individual Asian groups (Chinese, Japanese and Vietnamese) were also pooled. Patients were then stratified according to ethnicity (Asian vs non-Asian) and treatment status (never treated vs current or past treatment with IFN vs current or past treatment without IFN).

Asian study participants were diagnosed with CHB for a significantly longer period than non-Asian patients (9.24 vs 5.34 years, respectively) (Table 2). Asian patients were more likely than non-Asians to be educated to college level or higher, and married. Fewer Asian than non-Asian patients surveyed were employed and Asians had a lower income than non-Asians. Significantly fewer Asians than non-Asians were under the care of a physician (25% vs 63%, respectively), and in line with this finding, significantly more Asian than non-Asian patients had never been treated for CHB (70% vs 45%, respectively; treatment here does not include the use of traditional Chinese medicine). Prior use of herbal and/or traditional Chinese medicine was significantly more common among Asian than non-Asian patients (40% vs 13%, respectively).

Greater numbers of treated patients (with or without IFN) compared with never treated patients were under the care of a physician and had health insurance, were educated to college level or higher, were employed, and had a higher annual income (Table 2).

Table 1 Demographic and background characteristics of study population compared with that of the US chronic hepatitis B (CHB) patient based on ISIS data

Symptoms experienced in previous 12 months

In this survey population, a wide range of general (e.g. fatigue, headache) and liver-specific (e.g. jaundice and liver pain) symptoms were reported in the population as a whole irrespective of ethnicity. Almost all study participants (95%) reported experiencing symptoms within the last 12 months. Fatigue/loss of energy, loss of appetite and nausea were the three most common symptoms, reported by 90%, 79%, and 78% of study participants, respectively.

Fewer Asian subjects reported experiencing individual symptoms in the previous 12 months, except for liver pain, which was higher in Asian than in non-Asian patients (Fig. 1a). Differences in incidence of most symptoms were not significant between ethnic groups; however, nausea, muscle/joint pain and mental confusion were significantly less frequent in Asian patients than in non-Asian patients.

Patients who were never treated were significantly less likely to report experiencing individual symptoms in the previous 12 months compared with patients currently or previously treated with or without IFN, except for fatigue/loss of energy and vomiting, which were comparable between both groups (Fig. 1b). Although greater symptomatology was seen among treated patients, untreated patients still had relatively high levels of symptoms, with >50% reporting experiencing each symptom assessed in the previous 12 months. For the majority of symptoms, greater percentages of patients treated with IFN experienced the symptom in the last 12 months compared with those treated without IFN.

Severity of symptoms

Among all study participants, fatigue/loss of energy and muscle/joint pain were reported as the most severe symptoms, scoring a mean of 2.5 and 2.1, respectively, using a scale where 1 = not at all severe, 2 = not very severe, 3 = somewhat severe, 4 = very severe and 5 = extremely severe (data not shown). Subjects not experiencing a given

Table 2 Demographic and background characteristics of monoinfected chronic hepatitis B (CHB) study population by ethnicity and treatment status

	Ethnicity			Treatment status		
	Total (n = 258)	Non-Asian (n = 238)	Asian (n = 20)	Never treated (n = 120)	Treated with interferon (IFN) (n = 80)	Treated, no IFN (n = 58)
Mean (\pm SD) age, years	44 \pm 10	44 \pm 10	44 \pm 14	45 \pm 10	43 \pm 10	43 \pm 11
Gender, n (%)						
Male	148 (57)	134 (56)	14 (70)	66 (55)	50 (62.5)	32 (55)
Female	110 (43)	104 (44)	6 (30)	54 (45)	30 (37.5)	26 (45)
Race, n (%)						
Caucasian	133 (52)	133 (56)	–	54 (45)	44 (55)	35 (60)
African American	82 (32)	82 (35)	–	44 (37)	25 (31)	13 (22)
Asian	20 (8)	–	20 (100)	14 (12)	3 (4)	3 (5)
Other (incl. Hispanic)	23 (9)	23 (10)	–	8 (7)	8 (10)	7 (12)
Mean length of time (\pm SD) diagnosed with CHB, years	5.6 \pm 4.4	5.3 \pm 4.2	9.2 \pm 9.2*	5.2 \pm 4.3	6.2 \pm 4.9	5.8 \pm 4.1
Under physician care, n (%)						
Yes	154 (60)	149 (63)*	5 (25)	46 (38)***	63 (79)	45 (78)
No	99 (38)	86 (36)	13 (65)*	73 (61)	13 (16)	13 (22)
Treatment, n (%)						
Currently treated	93 (36)	91 (38)*	2 (10)	–	58 (73)	35 (60)
Previously treated	45 (17)	41 (17)	4 (20)	–	22 (28)	23 (40)
Never treated	120 (47)	106 (45)	14 (70)*	120 (100)	–	–
Herbals/TCM, n (%)						
Currently use	47 (18)	45 (19)	2 (10)	19 (16)	15 (19)	13 (22)
Previously used	40 (16)	32 (13)	8 (40)*	19 (16)	10 (13)	11 (19)
Never used	171 (66)	161 (68)	10 (50)	82 (68)	55 (69)	34 (59)
Had a liver biopsy, n (%)	57 (22)	54 (23)	3 (15)	23 (19)	19 (24)	15 (26)
Have health insurance, n (%)	189 (73)	176 (74)	13 (65)	71 (59)***	71 (89)	47 (81)
Married, n (%)	87 (34)	77 (32)	10 (50)	35 (29)	32 (40)	20 (35)
Education, n (%)						
High school or less	87 (34)	83 (35)	4 (20)	49 (41)	22 (28)	16 (28)
Some college or more	171 (66)	155 (65)	16 (80)	71 (59)	58 (73)	42 (72)
Employed, n (%)	198 (77)	187 (79)*	11 (55)	84 (70)**	68 (85)	46 (79)
Mean household income, (\pm SD) \$000s	42 \pm 26	43 \pm 26	36 \pm 10	37 \pm 26**	48 \pm 25	44 \pm 26

* $P < 0.05$ Asian vs non-Asian.

** $P < 0.05$ never treated vs treated with IFN.

*** $P < 0.05$ never treated vs either treatment arm.

TCM, traditional Chinese medicine.

symptom were assigned a score of 0. Interestingly, non-Asian patients reported more severe symptoms in every instance compared with Asian patients; these differences were significant for all symptoms except for liver pain, dark-coloured urine, sexual dysfunction and fainting (Fig. 2).

Impact of symptoms on daily life

Among all participants, fatigue/loss of energy and muscle/joint pain were reported to have the greatest impact on daily life, scoring a mean of 2.62 and 2.20, respectively, on a 5-point scale where 1 = not at all, 2 = a little bit, 3 = mod-

erately, 4 = quite a bit and 5 = extremely. Subjects not experiencing a given symptom were assigned a score of 0. Non-Asian patients frequently reported a greater impact on their daily lives than Asian patients, with 60% of all symptoms measured reaching statistical significance between the two groups (Fig. 3).

Lifestyle attitudes

There were differences observed between the Asian and non-Asian populations in this study with regard to their attitudes towards daily living and lifestyle. Significantly more Asian

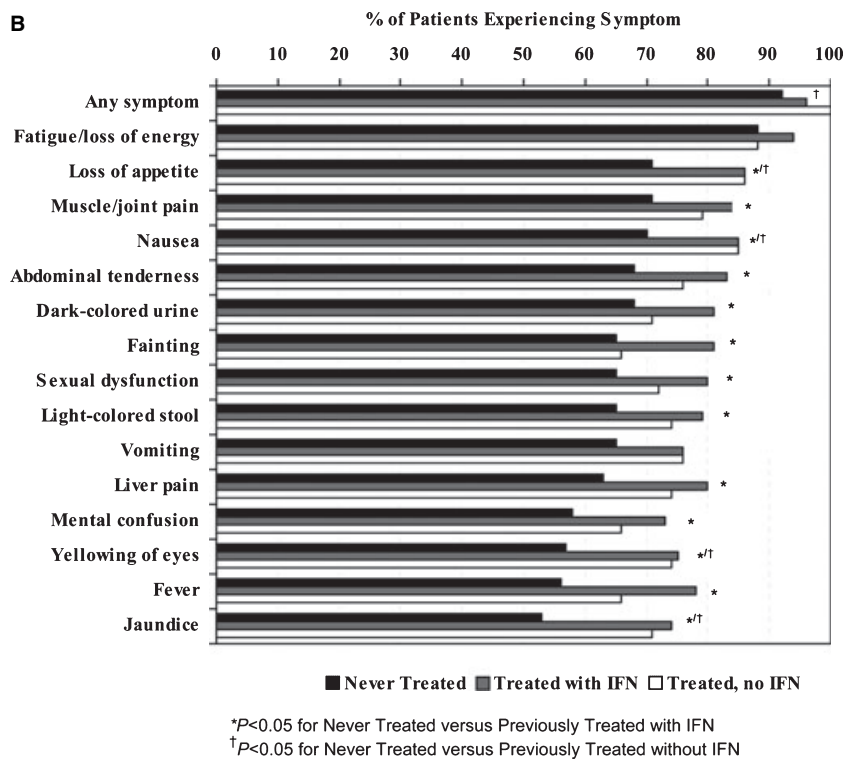
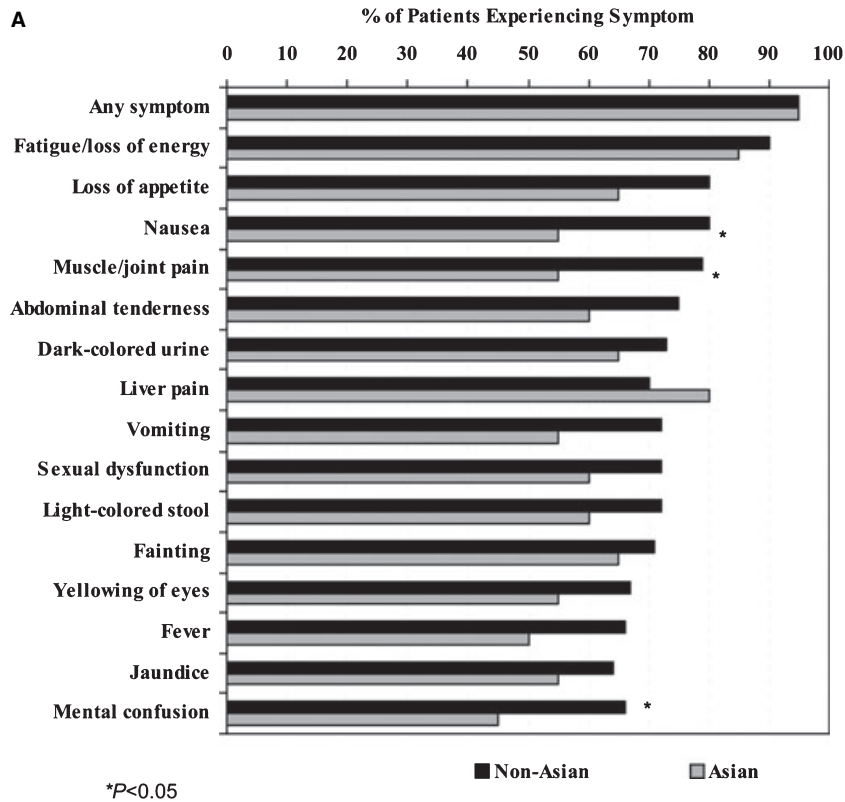


Fig. 1 (A) Symptoms experienced in previous 12 months by ethnicity ($n = 258$). Fig. 1. (B) Symptoms experienced in previous 12 months by treatment status ($n = 258$).

than non-Asian patients reported being easy-going (90% vs 72%) and happy with their lives (85% vs 56%) (Table 3). On the other hand, significantly more non-Asians than Asians believed that they could take charge of their life (82%

vs 55%), and worried a lot (58% vs 30%). In all, there were significant differences in lifestyle attitudes in more than three quarters of the categories assessed between the Asian and non-Asian populations.

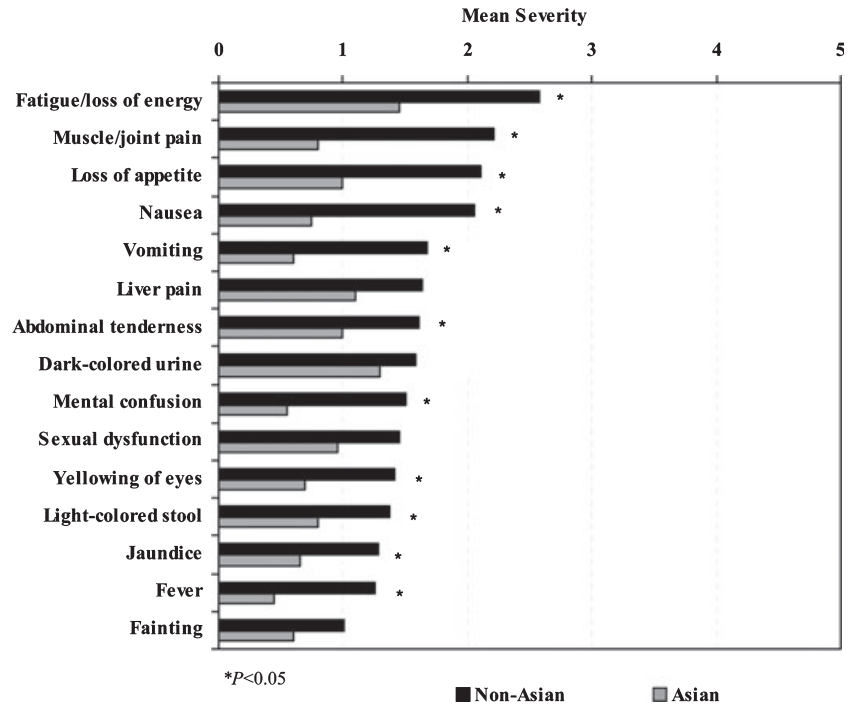


Fig. 2 Severity of symptoms by ethnicity. Severity of symptom: 0 = no given symptom, 1 = not at all severe, 2 = not very severe, 3 = somewhat severe, 4 = very severe, 5 = extremely severe.

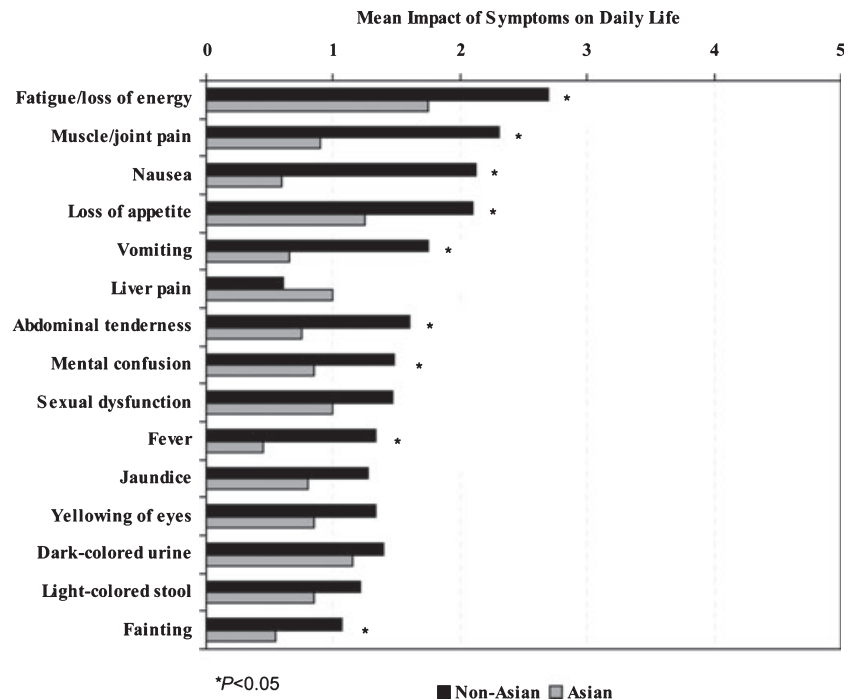


Fig. 3 Impact of symptoms on daily life severity of symptom: 0 = no given symptom, 1 = not at all, 2 = a little bit, 3 = moderately, 4 = quite a bit, 5 = extremely.

Attitudes towards general health and physicians

In this section of the questionnaire, subjects were asked to comment on general health attitudes, interaction with their physicians or extended healthcare provider and community. The subjects' perception of their health was mostly positive as was the relationship with their physicians. In fact, over

50% strongly agreed or somewhat agreed with 11 out of 13 of the statements included in this section. However, significantly more Asians (65%) than non-Asians (18%) reported difficulties in finding certain types of healthcare providers. In addition, significantly more Asian than non-Asian participants felt that they were not well informed of their lab test results. Interestingly, significantly more non-Asian

% Reporting agree strongly or somewhat	Total (n = 258)	By ethnicity	
		Non-Asian (n = 238)	Asian (n = 20)
A good night's sleep is important to me	88	87	100*
I believe you can take charge of your life	80	82*	55
I tend to be easy-going	74	72	90*
More often than not, I go with my gut feeling when I have to make a decision	67	69*	45
I am happy with my life	59	56	85*
I tend to worry a lot	56	58*	30
I like to pamper myself	57	60*	25
I put my needs before the needs of others	42	44*	15
I often feel depressed	41	43*	15
I spend a lot of time with support groups	35	37*	10
I am a sensitive person	68	68	65
I tend to be an emotional person	64	66*	45
At my work, I don't want people to know I'm not feeling well	54	54	55
I have to lead two lives	39	40	25

* $P < 0.05$.

patients actively seek health-related information. Although only a small percentage of patients were not confident of their doctors' knowledge of the right medications for them, the percentage was significantly higher in non-Asian patients (32%) than in Asian patients (10%) (Table 4).

Attitudes towards CHB and its treatment

Study subjects were asked to consider the relevance of CHB from a personal and societal standpoint. There was great discrepancy in attitudes between the Asian and non-Asian populations with 10 out of 14 categories revealing a significant difference between the two arms. Overall, Asians appeared to be more accepting of the disease, as exemplified by the fact that 85% did not think that CHB made them different from other people and 90% did not feel guilty who had the disease. This attitude was also reinforced by the number of Asians (80%) who indicated that CHB did not affect their dating habits. On the other hand, more non-Asian patients were concerned about developing liver disease and liver cancer, and reported an impact of CHB on various aspects of their lifestyle, including looking at life differently, re-evaluating their lifestyle, being scared of CHB, feeling guilty, being overwhelmed by CHB, feeling that they did not deserve CHB, dating less, and thinking first of CHB when they wake (Table 5).

DISCUSSION

End-stage liver disease resulting from CHB is associated with well-recognized clinical manifestations and costs to the US

Table 3 Lifestyle attitudes by ethnicity

healthcare system. However, to date, the impact of CHB on quality of life, including health attitudes and symptomatology, has not been well described. This is perhaps because of the long-held perception that CHB is relatively asymptomatic or 'silent' in patients with compensated liver function.

This diverse, cross-sectional study suggests that CHB is more symptomatic than has previously been recognized with 95% of participants reporting symptoms in the previous 12 months. Symptoms were reported frequently in both Asian and non-Asian populations; however, there was a significant difference in the majority of symptoms experienced between the arms with respect to those patients who received treatment and those who did not. Fatigue/loss of energy, loss of appetite and nausea were the three most common symptoms, reported by 90%, 79% and 78% of study participants, respectively. Of particular interest, symptomatology was greater in non-Asian compared with Asian patients and in currently or previously treated patients in comparison with never-treated patients. Symptoms reported in this survey, however, were mild, having less than moderate impact on daily life, which might have even led to under-reporting and/or under-detection of symptoms.

Interestingly, there seemed to be a socio-economic impact on treatment as significantly more non-Asians than Asians were under physician care. This was also reflected in the fact that significantly more non-Asians were employed than Asians. Not surprisingly, there was a significant difference in health insurance coverage among patients who had never been treated compared with those who were being treated with or without IFN, again reflecting a socio-economic aspect of this disease.

Table 4 Attitudes towards health and physicians by ethnicity

% Reporting agree strongly or somewhat	Total (n = 258)	By ethnicity	
		Non-Asian (n = 238)	Asian (n = 20)
I trust my doctor to prescribe the best things for me	78	79	65
I actively seek health-related information	73	74*	55
I am comfortable communicating with my doctor	71	72	60
My doctor keeps me informed of my lab test results	71	72*	50
I can't find a dentist or other types of doctor to treat me	22	18	65*
Looking good is really important to me	77	76	90
A positive attitude can help overcome physical disease	79	79	80
My family and friends are supportive of my health needs	74	73	80
I visit doctors regularly to ensure good health	64	63	75
My doctor speaks the same language as me	65	65	65
My doctor listens to me and values my input in treatment choices	62	63	55
My doctor understands me	62	63	50
Doctors really don't know what medications work for me	30	32*	10

* $P < 0.05$.

Table 5 Attitudes towards chronic hepatitis B and its treatment by ethnicity

% Reporting agree strongly or somewhat	Total (n = 258)	By ethnicity	
		Non-Asian (n = 238)	Asian (n = 20)
I am concerned with developing liver disease	85	87*	65
I look at life differently as I found out I have Hep B	70	73*	40
Living with Hep B has caused me to re-evaluate my lifestyle	69	71*	40
I'm just like other people—Hep B doesn't make me different	55	52	85*
I am scared of Hep B	62	65*	30
I did not deserve to get Hep B	59	62*	25
I feel completely overwhelmed about dealing with Hep B	52	55*	15
I am dating less now that I have Hep B	43	45*	20
Hep B makes me feel guilty	40	43*	10
Hep B is the first thing I think of when I wake up	32	34*	10
I am worried about developing complications of liver disease	79	80	65
I worry about getting liver cancer	73	74*	55
I am confident they will find a cure for Hep B in my lifetime	63	63	65
I do not like to talk with anyone about my Hep B	58	58	55

* $P < 0.05$.

Patients' attitudes, knowledge and perception of CHB may influence their acceptance of CHB and their reported symptoms. Asian patients reported a lesser impact of most symptoms on their daily lives and a greater degree of acceptance of the disease compared with non-Asian patients, which may be a key factor in the lower reporting of symptoms and associated impact on their daily life. Significant differences in lifestyle attitudes between the Asian and non-

Asian populations were observed in more than three quarters of the lifestyle categories assessed, which lead to the conclusion that these lifestyle attitudes may impact the reporting of, and the significance of, symptoms arising from CHB.

A more accepting attitude towards CHB could conceivably lead to slower entry into the healthcare system and account, in part, for presentation later in the natural history of the

disease. That the Asian population tended not to be scared of the disease (70%), did not feel guilty who had the disease (90%), and were not led to re-evaluate their lifestyle (60%) could be interpreted either as this population being in denial regarding the severity of the disease, or that Asian participants did not have easy or adequate access to information regarding the disease.

The physician–patient relationship, as shown in this study, was less strong between doctors and patients from the Asian community when compared with non-Asian subjects and this may also contribute to a lower reporting of symptomatology in the former group. Furthermore, the finding that Asian patients were less inclined to actively seek health-related information (despite more Asian patients being educated to college level or higher) is consistent with previous surveys reporting a lack of awareness among Asians of CHB and its consequences [17,18]. These findings suggest that CHB-treating physicians may need to devote more attention to patient symptomatology and case histories to better understand the impact of CHB in a culturally sensitive fashion.

Not surprisingly, symptomatology between treated and untreated patients differed to some extent. Overall, greater numbers of treated patients (currently or previously, with or without IFN) reported experiencing symptoms in the last 12 months, compared with never-treated patients. In general, greater numbers of patients treated with IFN experienced symptoms compared with those treated without IFN. The higher symptomatology observed in treated patients may be due to patients with symptoms being more likely to seek and/or receive treatment. Irrespective of the reason for the high frequency of symptoms in the treated population, it is striking to note that over 50% of never-treated patients reported each symptom within the previous 12 months. This relatively high degree of symptomatology among never-treated patients likely reflects symptoms attributable to CHB itself. Given that many of the symptoms reported in this study are more constitutional than liver-specific in nature, they may be related to chronic viral infection *per se* or HBV-related flares rather than to the effects of HBV on the liver. Though a control group of non-HBV-infected patients was not studied, these data reveal that a high proportion of untreated CHB patients are experiencing significant symptomatology. Therefore, physicians should routinely monitor CHB patients for constitutional symptoms given their prevalence and substantial impact on daily activities.

This was a cross-sectional analysis, a limitation of which was that improvement or worsening of patients' symptoms over time was not observed. Another possible limitation was that the self-identified study population could over-represent individuals concerned about their medical condition and/or individuals with greater symptomatology. Another limitation was that HCV-coinfected patients who were excluded from this study were solely identified on the basis of prior ribavirin use; patients treated with IFN were not excluded

from the study. As IFN can be used to treat both HBV and HCV infections, there is a possibility that some of the subjects included in our analyses might have been coinfecting with HCV. Also, clinical evaluation of HBV DNA levels was beyond the scope of this study; consequently, correlation of symptomatology to viral load and outcome of antiviral therapy could not be determined.

The low enrollment of Asian patients in this study was unexpected; despite concentrated efforts, recruitment of Asian patients was more challenging than that of Caucasian and African-American patients. This could be due to several factors, including potential social stigma associated with HBV infection, more passive acceptance of CHB, and/or conflicts with work schedules (many Asian study participants were self-employed). More research to address these issues is required.

In conclusion, this study suggests that CHB may be associated with greater symptomatology than currently recognized, and that patient perceptions of disease and attitudes about treatment may differ based on individual ethnicity and/or treatment experience. Further investigation of CHB symptomatology and its effect on patient perceptions and attitudes towards the disease state is warranted. There also appears to be a need to develop formalized measurement scales similar to the ones currently being used for HIV/HCV symptomatology studies. Future research using such validated scales will further enhance the understanding of CHB symptomatology.

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