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Lifestyle Of Patients Infected With Hepatitis C Virus

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Abstract

***Background**: Hepatitis C virus infection is a chronic inflammatory process leading to not only hepatic inflammation but also persistent systemic inflammation, **Aim:** The current study aimed to assess lifestyle of patients infected with hepatitis C virus. **Research Design**: Descriptive design was used. **Setting**: The stu[1]dy was conducted at Makkah hospitals. **Sample**: A convenient sample was used for this study; include 60 patients with Hepatitis C virus at outpatients, and inpatients units. **Tool**: Interview questionnaire tool was used to assess life style of patients infected with hepatitis C virus that consisted of four parts. Part 1: Socio demographic characteristics, Part 2: History of infection/disease, Part 3: Knowledge about hepatitis C virus infection, Part 4: Health status and lifestyle **Results:** Majority of the participants had unsatisfactory total knowledge about HCV. Majority of the participants have poor life style total scores. There is no statistically significant relation between patients' total knowledge and their personal characteristics. There is a highly statistically significant relation between patients' total life style and their ages, marital status, and education. Also, there is a statistically significant relation between patients' total life style and their six. **Conclusion:** Majority of the participants have poor life style total scores. There is no statistically significant relation between patients' total knowledge and their personal characteristics. There is a highly statistically significant relation between patients'total life style and their ages, marital status, and education. **Recommendations:** Provide educational programs to increase patient's knowledge regarding hepatitis C virus and improve patient's practice regarding hepatitis C virus which affect lifestyle.*

***Key words:** Lifestyle, Patients, Hepatitis C Virus.*

Introduction:

Hepatitis C virus (HCV) infection continues to be an important global health problem, and is one of the main causes of chronic liver disease worldwide. The long-term impact of Hepatitis

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C Virus infection is highly variable in Egypt, from minimal changes to extensive fibrosis and cirrhosis with or without hepatocellular carcinoma. The World Health Organization (WHO) estimates that about 3% of the world's population has been infected with HCV, but most of them are unaware of their infection and more than 170 million chronic carriers who are at risk of developing liver cirrhosis and/or liver cancer **(Petruzziello, et al.,2016).**

Every year, millions of people throughout the world become infected with viruses that cause acute and chronic hepatitis; the associated burden of ill health has become a major public health concern in all countries. Equally serious is the potential risk to nurses, midwives and other healthcare providers of becoming exposed and infected during direct care activities. These diseases are therefore important issues for public health measures aimed at prevention, early diagnosis and treatment **(Hanafiah, et al., 2018.).**

In the Eastern Mediterranean Region, itis estimated that approximately million people are infected with 8 people are infected with HCV annually, and is consider one of the five important infections that causes premature deathin the world. Annually, at least one million people die due to hepatitis in the world **(Gower,et al., 2018).**

According to recent estimates, more than185 million people around the world have been infected with the hepatitis C virus (HCV), of whom 350 000 die each year. One third of those who become chronically infected are predicted to develop liver cirrhosis or hepatocellular carcinoma. Despite the high prevalence of disease, most people infected with the virus are unaware of their infection. For many who have been diagnosed, treatment remains unavailable. Treatment is successful in the majority of persons treated, and treatment success rates among patients treated in low- and middle- income countries are similar to those in high- income countries **(Razavi, et al., 2019).**

The clients with hepatitis C infection need to change their lifestyle, adopting healthy behaviors. Lifestyle modifications are strongly recommended for patients with hepatitis C virus **(Nafeh, et al., 2017).**

Nurses play an important role in clients' education. nurses explain hepatitis to infected clients, tell them how the disease usually progresses and advise them on when to contacta doctor. Nurse should have acquired adequate information and insights to care effectively and safely for clients with viral hepatitis. The primary care nurse may undertake tasks such as specific diagnosis and initial assessment of the severity of disease, counseling the clients about the current understanding of the disease process and potential complications, as well as general issues of diet, mental health, andrecommendations about health-promotinglifestyle **(Yahia, 2018).**

A life-style is a mode of relatively consistent functioning. It includes ways of thinking and perceiving, ways of experiencing emotion, modes of subjective experience that are generally consistent patterns over broad areas of Lifestyle diseases (also sometimes called diseases of longevity or diseases of civilization interchangeably) are defined asdiseases linked with the way people live their life. This is commonly caused by alcohol, drug and smoking abuse as well as lack of physical activity and unhealthy eating **(Razavi, et al., 2019).**

Lifestyle is a systematized approach for management of chronic disease. The practice of lifestyle requires skills and competency in addressing multiple health risk behaviours and improving self-management. Lifestyle includediet, physical activity, behaviour change, body weight control, treatment plan adherence, stress and coping, spirituality, mind body techniques,

tobacco and substance abuse **(Pollan, 2008).**

Significance of the study: Hepatitis C virus (HCV) infection is a worldwide public health problem where its sero-prevalence had anestimated 2.8% increase over the last decade, corresponding to more than 185 million infections (3% of the world's population).Nearly three quarters of infected individuals are living in middle income countries. China, Pakistan, Nigeria, Egypt, India, and Russia together accounted for more than half of total infections **(Wyles, et al., 2017).**
Aim of the study:

This study aims to: The current study aimed to assess lifestyle of patients infected with hepatitis C virus.

Subjects & Methods

The current study aimed to assess lifestyle of patients infected with hepatitis Cvirus.

Research questions:
What is lifestyle of patients infected withHepatitis C virus?

I. Technical Design:
The technical design for the study included research design, setting of the study, study subjects, and tools of data collection.

Research design: A descriptive design was used to achieve the aim of the current study.

Settings: The current study was conducted at Makkah hospitals

Subjects: Convenient sample was used for this study; include all patients with HepatitisC virus at outpatients, and inpatients units. Totalnumber of patients with hepatitis C through three months was 60 patients.

Tools of data collection: One datacollection tool was used to carry out the current study namely; interviewing questionnaire sheet used to assess life style of patients infected with hepatitis C virus.

Interviewing questionnaire sheet: It was developed by the researcher and written in Arabic language based on review of related literatures in the field and consists of the following parts:

Part 1: Socio demographiccharacteristics (six; age; years of education; job status; marital status).

Part 2: History of infection/disease. It includes data about history of infection and disease that include; previous infectious diseases, diagnosis of the disease, duration of illness … etc.

Part 3: Knowledge about hepatitis C virus infection (effect of hepatitis C on liver, transmission of hepatitis C, prognosis of hepatitis C … etc.).

Scoring system: Patients responses werescored (two) for the complete correct answer, (one) for the partially correct answer and (zero) for incorrect answer. Mean and standard deviation was calculated and then converted into percent score. The knowledge was considered

satisfactory if percent score was 60% or more and unsatisfactory if less than 60%.

Part 4: Health status, social status, psychological status, spiritual status (lifestyle) and lifestyle for (smoking and drinking habits; diet; sports activity).

Scoring system: Lifestyle scoring systems were “never”, "sometimes" and “almost” which scored three, two, and one respectively. The scores of the items were summed up and the total divided by the number of items, giving a mean score for the part. Thesescores were converted to percent score. Total score of patients performance considered adequate if total percent score was 60% or moreand inadequate if the total percent score wasless than 60%**.**

Tools Validity: Face and contentvalidity of the study tools was assessed

Tools Reliability: The study tool wastested for its internal consistency by Cronbach’sAlpha.

Pilot study: Pilot study was carried out on 10% of the total study sample (6 patients) to evaluate the applicability, efficiency, clarity of tools, assessment of feasibility of field work, beside to detect any possible obstacles that might face the researcher and interfere with datacollection. Necessary modifications were done based on the pilot study findings such as (omission of some questions from tool) in order to strengthen their contents or for more simplicity and clarity. The pilot sample was excluded from the main study sample.

Field work: Data collection of the study was started at the beginning of January 2022, and completed by the end of March 2022.

The researcher first explained the aim of the study to the patients with hepatitis C and reassures them that information collected will be treated confidentiality and that it will be used only for the purpose of the research. The researcher met each patient alone. The researcher filled data for each patient by asking the patient about questionnaire sheet tools.

II- Administrative Design

An official letter requesting permissionto conduct the study was done

Ethical Consideration: Prior study conduction, ethical approval was obtained.The researcher met the patients to explain the purpose of the study and obtain their approval to participate in the study. They were reassured about the anonymity and confidentiality of the collected data, which was used only for the purpose of scientific research. The subjects’ right to withdraw from the studyat any time was assured.

III- Statistical Design:

The collected data were coded and entered into the statistical package for the socialscience (SPSS 23.0). Data was presented and suitable analysis was done according to the typeof data obtained for each parameter. Data were presented using descriptive statistics in the formof frequencies and percentages for categorical variables, and means and standard deviationsfor continuous quantitative variables. Qualitative categorical variables were comparedusing Chi-square (X^2) test but when the expected count is less than 5 in more than 20% of the cells; Fisher’s Exact Test was used. Person and spearman correlation was used to examine the correlation between quantitative and qualitative variables. Statistical significance was considered when P-value < 0.05.

Results:

Table 1:

	NO	%
Satisfactory knowledge	14	23.3
Unsatisfactory knowledge	46	76.7

Figure 1:

Table 2: Table shows that, majority of patients (82.7%) sometimes had self-confidence lifestyle, more than two thirds of them sometimes had good psychological lifestyle and social lifestyle (73.8% & 67.8%, respectively).

scores.

Table (3) and figure (2) shows that, majority of the participants have poor life style total

Patients' life style	Ne	ver	Some	times	Almost	
	%	No	%	No	%	No
1. Health status	2.7	4.4	38.1	63.5	11.2	18.6
2. Psychological status	5.4	8.9	44.3	73.8	10.3	17.2
3. Self confidence	6.3	10.4	49.6	82.7	2.9	4.8
4. Social status	15.3	25.5	40.7	67.8	6.5	10.8
5. Spiritual status	13.4	22.3	34	56.7	12.4	20.6
6. Sexual status	21.3	35.6	27.3	45.6	11.3	18.9
7. Physical activities	19.3	32.1	31.8	52.9	9	15
8. Nutritional status	18.9	31.5	31.7	52.9	9.4	15.6
9. Sleep and rest condition	16.3	27.2	26.7	44.5	17	28.3
10. Smoking and drug use	24.7	41.2	26.1	43.6	9.1	15.2

Table 3:

	NO	%
Good life style	10	16.7
Bad life style	50	83.3

Figure 2:

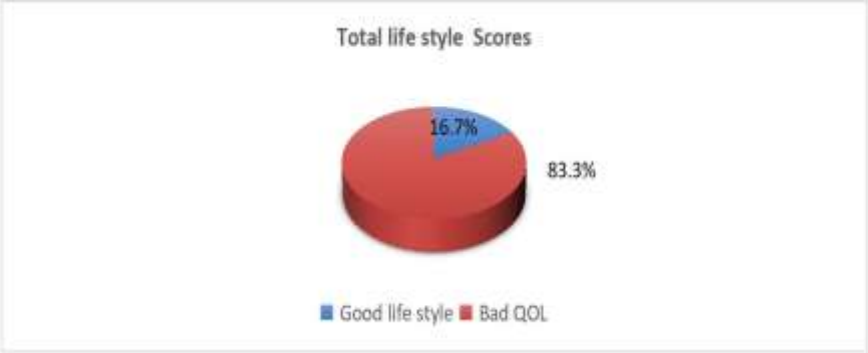

Table 4:

	Satisfactory knowledge			Unsatisfactory knowledge			
1. Age						8.26	..038*
- 35: <40 years	10	4	6.7	6	10		
- 40:< 50 years	31	14	23.3	14	23.3		
- 50:< 60 years	10	3	5	7	11.7		
- ≥ 60 years	9	4	6.7	5	8.3		
2. Six						3.39	.751
- Male	45	11	18.3	34	56.6		
- Female	15	6	10	9	15		
3. Marital status						1.63	.651
- Single	9	3	5	6	10		
- Married	23	8	13.3	15	25		
- Widowed	10	2	3.3	8	13.3		
- Divorced	18	7	11.7	11	18.3		
4. Education						9.47	.046*
- Illiterate	11	4	6.7	7	11.7		
- Read and write	8	3	5	5	8.3		
- Basic education	32	13	21.6	19	31.6		
- Secondary and more	9	2	3.3	7	11.7		

Table 5:

	Good life style			bad			
1. Age	60.1						.000**
- 35: <40 years	10	8	13.3	2	3.3		
- 40:< 50 years	31	11	18.3	20	33.3		
- 50:< 60 years	10	3	5	7	11.6		
- ≥ 60 years	9	4	6.6	5	8.3		
2. Six						4.11	.042*
- Male	45	10	16.6	35	58.3		

- Female	15	4	6.6	11	18.3		
3. Marital status						53.11	.000**
- Single	9	6	10	3	5		
- Married	23	7	11.6	16	26.6		
- Widowed	10	4	6.6	6	10		
- Divorced	18	5	8.3	13	21.6		
4. Education						60.12	.000**
- Illiterate	11	4	6.6	7	11.6		
- Read and write	8	3	5	5	8.3		
- Basic education	32	14	23.3	18	30		
- Secondary and more	9	7	11.6	2	3.3		

Table 6: correlation:

		Total knowledge	Total life style
Total knowledge	R	-	.418
	P	--	.038*
Total life style	R	.418	1
	P	.038*	--

Discussion:

Associated with health inequity; in low- and middle-income countries, infection with HCV is most commonly associated with unsafe injectionpractices and procedures such as renal dialysis and unscreened blood transfusions. Between 8 and 12billion injections are administered yearly around theworld and 50% of these are considered to be unsafe.In low and middle income countries, infection withHCV is frequently associated with unsafe injectionpractices and unscreened (or inadequately screened)blood transfusions **(Mostafa, et al., 2016).**

Regarding personal characteristics of the studied patients, the current study revealed that more than half of the participants had from 40- 50 years old, three quarters of them were male, more than one quarter were married. More than half of them had basic education, more than twofifths of them were unemployed, and two thirds of them live in rural area.

Similarly, this result was congruent with the study done by **Kandeel, et al., (2017)** who studied the prevalence of hepatitis C virus infection in Egypt and reported that more than half of patients detected their disease accidentally during routine surveys. Also, this finding was in agreement with the study done by **Khallaf, et al, (2019)** who studied Forecast and Manipulation of HCV Eradication in Egypt based on its National Screening Project and indicated that more two fifths of patients had smoking habits and taking information aboutthe disease from their physician.

Regarding patients' knowledge about hepatitis C virus, the current study revealed that majority of the participants know that HCV can cause the liver damage/ cancer, can be transmitted by being born to a woman who had HCV when she gave birth. While majority of them didn't know that HCV can be transmitted by shaking hands with someone who has HCV, the side effects of hepatitis C medications were too extreme for most people, and people had been treated poorly or unfairly by doctors or health care workers because of their substance use.

This result was supported by **Litwin, et al., (2016)** who studied the primary care-based

interventions are associated with increases inhepatitis C virus testing for patients at risk. Digestive and Liver Disease and found that more than half of patients had knowledge about the effect of the disease on their liver but didn't know that the disease can be transmitted by shaking hands. Additionally, this result insimilar to the study done by **Lloyd, et al., (2017)**who studied safety and effectiveness of a nurse-led outreach program for assessment and treatment of chronic hepatitis C in the custodial setting and stated that majority of patients didn'tknow the side effects of HCV medications.

Regarding patients' life style (healthstatus), the current study revealed that majority of the participants always feel discomfort continuously. All of them their health condition prevents them from taking care of their home. Majority of them their health condition prevents them from taking care of themselves, prevents them from taking enough comfort.

In the same line, this result was in agreement with the study done by **Localio, et al., (2019)** who studied hepatic decompensation in antiretroviral-treated patients co-infected with HIV and hepatitis C virus compared with hepatitis C virus-mono-infected patients and reported that more than half of patients and found that more than three quarters of patients didn't able to take care of themselves and their condition prevents them from taking enough comfort.

Moreover, this result was congruent withthe study done by **Marcellin, et al., (2017)** who studied Adherence to treatment and quality of life during hepatitis C therapy: A prospective, real-life, observational study and stated that majority of patients didn't able to perform duties related to their home and had continuous feelingof discomfort.

Regarding patients' life style (psychological status), the current study revealed that majority of the participants sometimes feel that they hadn’t the ability to adapt to their illness, fear the cost of treatment, can't control the important things in their life, feel that they had become a burden on their family, tend to look at the bright side of their life, avoid dealing with others, and feel angryfor anything.

This finding was supported by **Marshall, et al., (2019)** who studied liver disease knowledge and acceptability of non-invasive liver fibrosis assessment among people who inject drugs in the drug and alcohol setting and found that had sense of being burden on their family and avoid dealing with others

Conversely, this result was in disagreement with **Morris, et al (2017)** who studied Injection drug use and hepatitis C virus infection in young adult injectors: Using evidence to inform comprehensive prevention and found that majority of participants could dealing with others, and adapted with their diseases.

Regarding patients' life style (self- confidence), the current study revealed that majority of the participants sometimes feel satisfied with meaning of life, interested with their physical health, suffer from stress, able to think and decide your life, and think in happy things before sleeping.

This result was in agreement with **Amorosa, et al, (2018)** who studied Adherence to hepatitis C virus therapy and early virologic outcomes and found that majority of patients were satisfied with nature of disease. Also this result was supported with **Galeras, et al, (2017)** who studied Poor response to hepatitis C virus (HCV) therapy in HIV and HCV-co-infectedpatients is not due to lower adherence to treatment and found that majority of participants had stress due to

disease that effect on their life style.

Regarding patients' life style (social status), the current study revealed that majority of the participants sometimes their illness causes they to be isolated from people, satisfied with their social relationships, satisfied with their family members dealing with you, and their disease effects on their social relations.

This result was accordance with **Hanafiah, et al, (2018)** who studied Global epidemiology of hepatitis C virus infection: new estimates of age-specific antibody to HCV and found that majority of patients had good relations with their family members. Conversely, this result was in disagreement with **Norman, et al., (2016)** who studied The acceptability and feasibility of peer worker support role in community based HCV treatment for injecting drug users and found that majority of patients hadn't adapted with disease and had poor relation with others person.

Regarding patients' life style (spiritual status), the current study revealed that majority of the participants sometimes intensify their relationship with God, and they belief provides their contentment in the fact that God is with them. More than two thirds of them sometimes they are utilizing religiosity to cope with life- threatening illness, more than half of them sometimes God will reward them for suffering, prayer is performed from core of the heart, it provides healing, and Sometimes they feel that this disease is a punishment.

This result was accordance with **Shalaby,et al, (2017)** who studied Hepatitis B and C viral infection: prevalence, knowledge, attitude and practice among barbers and clients and found that majority of patients had good relations with Allah, and performed the pray at the same time. Also, this result was in agreement with **Folwaczny, et al, (2016)** who studied Adherence and mental side effects during hepatitis C treatment with interferon Alfa and ribavirin in psychiatric risk groups and found that majority of participant's feel that thisdisease was a punishment from God

Regarding Patients' life style (sexual status), the current study revealed that more than two thirds of the participants sometimes have complete sexual, more than half of them sometimes aroused when they see somethingexciting and have their sex life been affected since their illness.

This result was supported with **Peters, et al, (2017)** who studied Influence of cannabis use on severity of hepatitis C disease and found that majority of patients had normal life with sexual status. Conversely, this result was in disagreement with **Nolan, et al, (2018)** who studied The impact of methadone maintenance therapy on hepatitis C incidence among illicit drug users and found that majority ofparticipants couldn't practice sexual status with normal

Regarding patients' life style (Physicalactivities), the current study revealed that more than two thirds of the participants sometimes doexercises continuously to avoid weight gain anddo enough exercises regularly. More than two fifths of them sometimes able to do their activity daily livings without tiredness

This result was accordance with **Miller and Abu-Raddad (2017)** who studied Evidence of intense ongoing endemic transmission of hepatitis C virus and found that majority of patients participate exercises to enhance physical activity. Conversely, this result was in disagreement with **Liu et al, (2017)** who studiedPeginterferon alfa-2a plus ribavirin for the treatment of dual

chronic infection with hepatitis C viruses and found that majority of patient hadn't normal weight,

Regarding patients' life style (nutritional status), the current study revealed that nearly one half of the participants take only sufficient foods while majority of them sometimes avoid smoking for keeping their health condition. More than half of them take snakes between meals, eat a healthy diet, restrict protein or salt intake, and avoid alcohol drinks.

This result was supported with **Kowdley, et al, (2019)** who studied Virologic response rates to all oral fixed-dose combination ledipasvir/sofosbuvir regimens were similar in patients with and without traditional negative predictive factors and found that majority ofpatients took healthy diet with avoided protein and fats. Conversely, this result was in disagreement with **Funk, et al, (2017)** who studied The prevalence of hepatitis C virus infection: implications for future policy on prevention and treatment and found that majority of patients take unhealthy diet, and not respected with hepatic foods.

Regarding patients' life style (Sleep and rest condition), the current study revealed that more than half of the participants had continuous sleep without interruptions and performe their work as they can. Nearly half of them sometimes sleep from 6-8 hours at night.

This result was accordance with **Hellard, et al, (2017)** who studied The impact of injecting networks on hepatitis C transmission and treatment in people who inject drugs and found that majority of patients sleep for long time from 6:8 hours.

Regarding patients' life style (Smoking and drug use), the current study revealed that more than half of the participants never feel of needing narcotic drugs. More than half of them use drugs when feeling sever pain, take narcotics when prescribed by physician, and have friends who encourage drug use.

This result was supported with **Nguyen, et al, (2018)** who studied Daily cannabis smoking as a risk factor for progression of fibrosis in chronic hepatitis C and found that majority of patients never feel you need narcotic drugs, and know that smoking affect negatively on their disease.

Regarding the correlation between patients' total knowledge and their total life style, the current study revealed that, there wasa statistically significant correlation between patients' total knowledge and their total life style scores

This result was in agreement with **Grebely, et al, (2018)** who studied Uptake of hepatitis C treatment among people who inject drugs attending needle and syringe programsand found that there is a statistically significant relation between patients' total knowledge and their total life style scores.

Conclusion:

This study concluded that, majority of the participants had unsatisfactory total knowledge about HCV. Majority of participants have poor life style total scores. There is no statistically significant relation between patients' total knowledge and their personal characteristics. There is a highly statistically significant relation between patients' total life style and their ages, marital status, and education. Also, there is a statistically significant relation between patients' total life style and their six. There is a statistically significant relation between patients' total knowledge and their total life style score

Recommendations:
In the light of results of this study, thefollowing recommendations were suggested:

For patient:

- Provide educational programs to increase patients' knowledge regarding hepatitis C virus

- Improve patients' practice regarding hepatitis C virus which affect their lifestyle.

In service:

- Counseling program for increasing patients' ability to cope successfully with their hepatitis C virus.

- Enhance lifestyle of patients infected with hepatitis C virus

- Priority should be given to increase awareness of patients infected with hepatitis C virus which affect their lifestyle.

References:

- **Petruzziello A, Marigliano S, Loquercio G, Cozzolino A, Cacciapuoti C. (2016):** Global epidemiology of hepatitis C virus infection: Anup-date of the distribution and circulation of hepatitis C virus genotypes. World J Gastroenterol;22(34):7824-40.

- **Hanafiah K, Groeger J, Flaxman AD, WiersmaST. (2018):** Global epidemiology of hepatitis Cvirus infection: new estimates of age-specific antibody to HCV seroprevalence. Hepatology (Baltimore, Md);57(4):1333-42.

- **Gower E, Estes C, Blach S, Razavi-Shearer K,Razavi H. (2018):** Global epidemiology and genotype distribution of the hepatitis C virus infection. J Hepatol;61(1 Suppl):S45-57.

- **Razavi H, Elkhoury AC, Elbasha E, Estes C, Pasini K, Poynard T, (2019):** Chronic hepatitisC virus (HCV) disease burden and cost in theUnited States. Hepatology (Baltimore, Md);57(6):2164-70.

- **Nafeh MA, Medhat A, Shehata M, Mikhail NN,Swifee Y, Abdel-Hamid M, (2017):** Hepatitis Cin a community in Upper Egypt: I. Cross- sectional survey. Am J Trop Med Hyg.;63(5- 6):236-41.

- **Yahia M. (2018):** Global health: a uniquely Egyptian epidemic. Nature.; 474(7350):S12-3.

- **Pollan, M. (2008):** In Defense of Food: An Eater'sManifesto. Penguin Press HC.

- **Wyles, D. L., Ruane, P., Sulkowski, M., Dieterich,D., Luetkemeyer, A. F., Morgan, T. R., et al. (2017).** Daclatasvir in combination with sofosbuvir for HIV/HCV coinfection: ALLY-2 study. 22nd conference on retroviruses andopportunistic infections.

- **Mostafa A, Taylor SM, El-Daly M, El Hoseiny M,Bakr I, Arafa N, (2016):** Is the hepatitis C virus epidemic over in Egypt? Incidence and risk factors of new hepatitis C virus infections. Liver Int;30(4):560-6.

- **Kandeel A, Genedy M, El-Refai S, Funk AL, Fontanet A, Talaat M. (2017):** The prevalenceof hepatitis C virus infection in Egypt 2015: implications for future policy on prevention andtreatment. Liver Int;37(1):45-53.

- **Khallaf, N., El-Hcfnawv, N., & Abd-El-Raouf, O. (2019).** Forecast and Manipulation of HCV Eradication in Egypt based on its National Screening Project. In 2019 Ninth International Conference on Intelligent Computing and Information Systems (ICICIS) (pp. 39-47).

- **Litwin, A. H., Smith, B. D., Drainoni, M. L., McKee, D., Gifford, A. L., Koppelman, E., etal. (2016).** Primary care-based interventions areassociated with increases in hepatitis C virus testing for patients at risk. Digestive and LiverDisease, 44, 497–503.

- **Lloyd, A. R., Clegg, J., Lange, J., Stevenson, A.,Post, J. J., Lloyd, D., et al. (2017).** Safety and effectiveness of a nurse-led outreach program forassessment and treatment of chronic hepatitis Cin the custodial setting. Clinical Infectious Diseases, 56, 1078–1084.

- **Localio, A. R., Lim, J. K., Goetz, M. B., et al. (2019).** Hepatic decompensation in antiretroviral-treated patients co-infected with HIV and hepatitis C virus compared with hepatitis C virus-monoinfected patients: A cohort study. Annals ofInternal Medicine, 160, 369–379.

- **Marcellin, P., Chousterman, M., Fontanges, T.,Ouzan, D., Rotily, M., Varastet, M., et al. (2017).** Adherence to treatment and quality of lifeduring hepatitis C therapy: A prospective, real-life, observational study. Liver International, 31,516–524.

- **Marshall, A. D., Micallef, M., Erratt, A., Telenta,J., Jones, S. C., Bath, N., et al. (2019).** Liver disease knowledge and acceptability of non-invasive liver fibrosis assessment among peoplewho inject drugs in the drug and alcohol setting:The LiveRLife Study. International Journal of Drug Policy, 26(10), 984–991.

- **Morris, M. D., Hahn, J. A., Maher, L., & Prins, M. (2017). Injection drug use and hepatitis C virus infection in young adult injectors: Usingevidence to inform com-prehensive prevention. Clinical Infectious Diseases, 57(Suppl 2), S32–S38.**

- **Amorosa, V. K., Localio, A. R., O'Flynn, R., Teal,V., Dorey-Stein, Z., et al. (2018).** Adherence to hepatitis C virus therapy and early virologic outcomes. Clinical Infectious Diseases, 48, 186–
- 193. Lo Re, V., 3rd, Kallan, M. J., Tate, J. P.,

- **Galeras, J. A., Montoliu, S., Tural, C., Force, L.,Torra, S., et al. (2017).** Poor response to hepatitis C virus (HCV) therapy in HIV- andHCV-coinfected patients is not due to lower adherence to treatment. AIDS Research and Human Retroviruses, 22, 393–400.

- **Norman, J., Walsh, N. M., Mugavin, J., Stoove, M. A., Kelsall, J., Austin, K., (2016).** The acceptability and feasibility of peer worker support role in community based HCV treatmentfor injecting drug users. Harm Reduction Journal, 5, 8. Page, K.,

- **Shalaby S, Kabbash I, El Saleet G, Mansour N,Omar A, El Nawawy A. (2017):** Hepatitis Band C viral infection: prevalence, knowledge, attitude and practice among barbers and clients inGharbia governorate, Egypt. East MediterrHealth J.; 16(3):280.

- **Folwaczny, C., Schaefer, M., Schmidt, F., Lorenz,R., Martin, G., Schindlbeck, N., et al. (2016).** Adherence and mental side effects duringhepatitis C treatment with interferon alfa and ribavirin in psychiatric risk groups. Hepatology,37, 443–451.

- **Peters, M. G., Jin, C., Louie, K., Tan, V.,Bacchetti, P., et al. (2017).** Influence of cannabisuse on

severity of hepatitis C disease. ClinicalGastroenterology and Hepatol-ogy, 6, 69–75.

- **Nolan, S., Dias Lima, V., Fairbairn, N., Kerr, T.,Montaner, J., Grebely, J., (2018).** The impact **of methadone maintenance therapy on hepatitis Cincidence among illicit drug users. Addiction, 109, 2053–2059.**

- **Miller FD, Abu-Raddad LJ. (2017):** Evidence ofintense ongoing endemic transmission of hepatitis C virus in Egypt. Proc Nat Acad Sci;107(33):14757-62.

- **Liu, C. J., Chuang, W. L., Lee, C. M., Yu, M. L., Lu, S. N., Wu, S. S., et al. (2016). Peginterferonalfa-2a plus ribavirin for the treatment of dual chronic infection with hepatitis B and C viruses. Gastroenterology, 136. 496–504.e493.**

- **Kowdley, K. V., Yang, J. C., Zhu, Y., Hyland, R.H., (2019).** Virologic response rates to all oralfixed-dose combination ledipasvir/sofosbuvir regimens are similar in patients with and without traditional negative predictive factors, Journal ofViral Hepatitis, 19, 112–119.

- **Funk AL, Kandeel A, Genedy M, El-Refai S, Fontanet A, Talaat M. (2017):** The prevalence **of hepatitis C virus infection in Egypt: implications for future policy on prevention andtreatment. Liver Int;37(1):45-53.**

- **Hellard, M., Rolls, D. A., Sacks-Davis, R., Robins,G., Pattison, P., Higgs, P., et al. (2017).** The impact of injecting networks on hepatitis C transmission and treatment in people who injectdrugs. Hepatology, 60, 1861–1870.

- **Nguyen, S., Hezode, C., Roudot-Thoraval, F., Grenard, P., Julien, B., Zafrani, E. S., et al.(2018).** Daily cannabis smoking as a risk factorfor progression of fibrosis in chronic hepatitis C.Hepatology, 42, 63–71.

- **Grebely, J., Topp, L., Wand, H., Dore, G., & Maher, L. (2018).** Uptake of hepatitis C treatment among people who inject drugsattending Needle and Syringe Programs in Australia, 1999–2011. Journal of Viral Hepatitis,21, 198–207.