Original Research Article

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ENHANCED ACCESS TO TESTING & DIAGNOSIS & HEPATITIS C BURDEN; A PUBLIC HEALTH INTERVENTION

ABSTRACT

OBJECTIVE

To gauge the effect of increasing access to care and streamlining testing and diagnosis on hepatitis C burden (incidence of disease, rate (%) of complications, adverse events and mortality) in a rural population.

METHODOLOGY

This quasi-experimental research was conducted at Taluka Gambat (Khairpur, Sindh, Pakistan) from August 2019 to January 2021. This public health intervention, comprised of establishing collection points, near healthcare centers in Gambat Taluka, that facilitated the sample collection, transport and testing of patient samples (for Hep C). The test results along with basic biodata, sociodemographic details, disease particulars, presenting signs and symptoms (and their duration), of consenting patients, were recorded onto a structured questionnaire and the data analyzed using SPSS. v. 21.0.

RESULTS

A total of 492 individuals were studied. The mean age of the sample was 32.5± 6.9 years with an age range of 18 to 65 years. Pre-Intervention (establishment of collection units) records showcased a lower frequency of cases being reported, which jumped to more than three-fold following provision of greater access to testing and diagnosis. The number of cases presenting

with Hep C complications though, steadily declined (from 66.7% to 12.1% - p: < 0.05), and the mortality rate took a significant dive (33.3% to 0% - p: < 0.05). The incidence of diagnosed cases presenting with adverse outcomes (liver cirrhosis, liver failure and hepatic carcinoma) fell sharply, from 33% to 6.1% - p: < 0.05.

CONCLUSION
Enhanced access to care and streamlining testing and diagnosis, overtime reduced the disease burden associated with Hepatitis C, by identifying patients with the disease early before the disease progresses and leads to adverse events.

KEYWORDS
Health Services Accessibility, Hepatitis C, Liver Failure, Public Health, and Rural Population. Burden.

INTRODUCTION

Chronic diseases constitute a fast-increasing burden to society, and with an estimated 46% of global disease and 59% of mortality attributable to chronic diseases (as per WHO records), [1] worries regarding not only the health impact but the overall burden of disease (morbidity and socioeconomic value) is believed to be fast becoming unbearable, especially in the developing world. [2]

Liver disease garners the most attention (among chronic illnesses), ue to being one of the top five causes of death worldwide, [2] and (unlike other major global causes of mortality), its consistently increasing fatality rate (increase of > 100% for men and > 50% women). [3] The challenges this rise poses to the healthcare system and the governments as a whole is huge, given that the estimated numbers of HCV infected subjects worldwide are an estimated 170 million. [4]

It is claimed that 3% of all the global population is infected with HCV (range: 0.1 to 12% - depending on the region/country), hence equally an approximate 170 million chronic carriers worldwide. The high annual incidence (up to 3 cases per 100,000 persons), adds to the already worrisome condition. [5, 6]

The seroprevalence of HCV in different parts of Pakistan (in past 5 years), ranged from 2.2% to 13.5% with highest seroprevalence of HCV being 13.5% (Lahore). [7] Among the many adverse events (that may result from HCV infection), Chronic Liver Disease and Cirrhosis are the

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commonest – both of which may culminate in Liver Failure, [8] and are responsible for nearly as many fatalities as diabetes mellitus.[9]

The high morbidity and mortality statistics (despite the condition being treatable) may be attributed to the poor access to testing and diagnosis in the country.[9] This research aims to test this believe by gauging the effect of increasing access to care and streamlining testing and diagnosis on hepatitis C burden (incidence of disease, rate (%) of complications, adverse events and mortality) in a rural population.

METHODS

Study Design: Quasi Experimental
Study Setting: Taluka Gambat
Duration: April 2019 to January 2021
Ethical Approval: (Ref: No. D PAQSJIMS/REC/1612)
Informed Consent: Written Informed Consent Obtained

Sample Size Criteria: Since the local prevalence of HCV was unknown, an estimated 50% proportion was entered into the Openepi sample size calculator and keeping acceptable margin of error as 5% and a confidence interval of 95% to obtain a sample size of 384. 10% addition sample was planned to be included to account for possible incomplete responses, loss to follow-up and false positive reports each, bringing the sample size up to 498 (rounded to 500). A total of 492 complete responses were received and 4 lost to follow-up while 4 were discarded due to being incomplete.

Sampling Technique: Non-Probability – Consecutive Sampling

The research was part of a multi-phasic health intervention.

1. Phase I: Collection points were created near healthcare centers in Gambat Taluka, that facilitated the sample collection, transport and testing of patient samples (for Hep C)
2. Phase II: Healthcare providers were trained on the effective management of Hep C (in line with WHO protocols)
3. Phase III: Mass screening and awareness campaigns were organized.

The changes in the disease burden (gauged with regards to number of new cases reported, patients presenting with complications and mortality – as per official health records (at Pir Syed Abdul Qadir Shah Jeelani Institute of Medical Sciences, Gambat, Khairpur, Sindh, Pakistan) pertaining to Hep C were studied. The health records of patients (presenting during the study duration) with a confirmed diagnosis of Hep C (as per qualitative HCV laboratory report) were included in this research. Patients with other major systemic diseases (diabetes and hypertension)

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and a previous history of metastatic cancer (primary site other than liver), were excluded from the sample. The pre-intervention and post-interventions statistics (incidence of disease, rate (%) of complications, adverse events and mortality) were compared using the paired t test and a p value of less than 0.05 taken as statistically significant.

RESULTS

A total of 492 individuals were studied. The mean age of the sample was 32.5± 6.9 years with an age range of 18 to 65 years. Pre-Intervention (establishment of collection units) records showcased a lower frequency of cases being reported, which jumped to more than three-fold following provision of greater access to testing and diagnosis.

The mean age of the sample was 32.5± 6.9 stood at 32.5 (SD ± 6.9) years with an age range of 18 to 65 years. The sample was predominantly male (69.7%) and majority of the patients hailed from a lower socioeconomic class (58.9%). Pre-Intervention records showcased a lower frequency of cases being reported, which jumped to more than three-fold following provision of greater access to testing and diagnosis.

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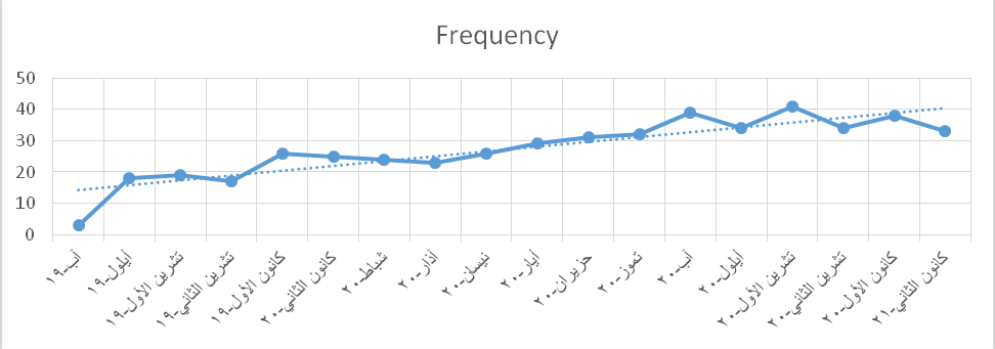

Fig. 1. Frequency of cases

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The number of cases presenting with Hep C complications though, steadily declined (from 66.7% to 12.1% - p: < 0.05), and the mortality rate took a significant dive (33.3% to 0% - p: < 0.05). The incidence of diagnosed cases presenting with adverse outcomes (liver cirrhosis, liver failure and hepatic carcinoma) fell sharply, from 33% to 6.1% - p: < 0.05.

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Table 1. **Patients presenting with Complications**

Month	New Cases	Patients presenting with Complications	Adverse Outcomes *	Mortality **
2019				

August	*03*	*2 (66.7%)*	*1 (33.3%)*	*1 (33.3%)*
September	*18*	*6 (33.3%)*	*2 (11.1%)*	*1 (5.6%)*
October	*19*	*7 (36.8%)*	*3 (15.8%)*	*2 (10.5%)*
November	*17*	*6 (35.3%)*	*2 (11.8%)*	*1 (5.9%)*
December	*26*	*5 (19.2%)*	*4 (15.4%)*	*0*
2020				
January	*25*	*7 (28%)*	*1 (4%)*	*0*
February	*24*	*9 (37.5%)*	*0*	*0*
March	*23*	*6 (26.1%)*	*3 (13%)*	*3 (13%)*
April	*26*	*8 (30.8%)*	*4 (15.4%)*	*0*
May	*29*	*5 (17.2%)*	*2 (6.9%)*	*1 (3.5%)*
June	*31*	*6 (19.4%)*	*5 (16.1%)*	*1 (3.2%)*
July	*32*	*4 (12.5%)*	*3 (9.4%)*	*3 (9.4%)*
August	*39*	*8 (20.5%)*	*2 (5.1%)*	*0*
September	*34*	*7 (20.6%)*	*3 (8.8%)*	*3 (8.8%)*
October	*41*	*5 (12.2%)*	*1 (2.4%)*	*0*
November	*34*	*6 (17.7%)*	*1 (2.9%)*	*1 (2.9%)*
December	*38*	*6 (15.8%)*	*0*	*0*
2021				
January	33	*4 (12.1%)*	*2 (6.1%)*	*0*

When compared statistically, the analysis revealed the impact of increasing access to care and streamlining testing and diagnosis on hepatitis C burden, as statistically significant.

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Table 2. Results of intervention

Variable	Pre – Intervention (Aug 2019)	Post – Intervention (Jan 2021)	P Value
Complications	*66.7%*	*12.1%*	*< 0.05*
Adverse Events	*33.3%*	*6.1%*	*< 0.05*
Mortality	*33.3%*	*0%*	*< 0.05*

DISCUSSION

The purpose of this research was to observe the impact of increasing access to care and streamlining testing and diagnosis on hepatitis C burden. The term burden here refers to the proportion of complications, adverse events and mortality (associated with Hep C), relative to the incidence of Hep C (new cases). Middle aged adults were the commonest age group in this research and a majority belonged to the male gender. Given that the male to female ratio in the country (general population) is equal (as per the latest Pakistan Demographic Health Survey), a

predominance of male population in the study leads us to believe that men are more affected by Hep C than females. [10]

The World Health Organization (WHO) has long strived to tackle the problem of HCV and most recently, it has de declared the desired global targets for diagnosis and treatment of HCV, which may be the most decisive step in the direction of global elimination of HCV by 2030. However, the uptake rates of HCV testing, diagnosis and eventual seeking of care remain poor across many countries, including Pakistan. A major roadblock, thus in the management of HCV, is the consequent silent progression (from acute to chronic condition), of HCV in the absence of testing and diagnosis. [11, 12]

Pre-Intervention (establishment of collection units) records showcased a lower frequency of cases being reported, which jumped to more than three-fold following provision of greater access to testing and diagnosis. This was expected since the testing and diagnosis rate was insufficient formerly and adequate testing and diagnosis revealed a more accurate picture of the incidence of this disease in the locality (data pertaining to which is not previously published in literature).

Acute infection is in most (up to 70%) cases, asymptomatic and most HCV patients learn about their diagnosis decades after contracting the illness, when the condition has manifested into more severe stages of cirrhosis, hepatocellular carcinoma (HCC), or liver failure. Thus, it is of prime importance, that vulnerable populations (I.V drug abusers, frequent blood/clotting factor transfusion recipients, long‑term hemodialysis recipients, human immunodeficiency virus (HIV)‑patients, individuals with known HCV exposure, traced contacts of known HCV patients, and children born to chronically infected mothers) be screened down to every locality. [13 - 16]

The number of cases presenting with Hep C complications after making testing and diagnosis more accessible, steadily declined over a short period of time and the mortality rate took a significant dive. The incidence of diagnosed cases presenting with adverse outcomes (liver cirrhosis, liver failure and hepatic carcinoma) fell sharply, from 33% to 6.1%.

This is substantiated by published evidence which claims that in the absence of effective screening and testing up to 75% chronically infected patients remain unaware of their diagnosis even after developing marked complications. It is indicative of the fact that our current estimates of the healthcare burden associated with HCV are inaccurate and largely underappreciated. [17 - 20]

Even if change is brought today, it will likely take time before everyone who is infected is appropriately tested, diagnosed and provided relevant care. [21] However, it is never too late to begin. Our public health intervention began to yield results in a matter of months as can be visualized in Figure 01 and Table 01. Though, the incidence of new cases climbed up, the percentage of people developing complications fell and the mortality rate declined. The intervention, as simple as offering the means to achieve a diagnosis (testing / screening) is the key to solving the HCV problem.

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However, a limitation of this research is that we don't arrange for long-term follow-up of the patients and it is not observed whether and how the outcome of early diagnosed and late diagnosed individuals is different at the study setting.

CONCLUSION

Enhanced access to care and streamlining testing and diagnosis, overtime reduces the disease burden (incidence of disease, rate (%) of complications, adverse events and mortality) associated with Hepatitis C, by identifying patients with the disease early.

REFERENCES

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1. *Abegunde DO, Mathers CD, Adam T, Ortegon M, Strong K. The burden and costs of chronic diseases in low-income and middle-income countries. Lancet. 2007 Dec 8;370(9603):1929-38.*
2. *UK national statistics. Available at: http://www.statistics.gov.uk/*
3. *Leon DA, Mc-Cambridge J. Liver cirrhosis mortality rates in Britain, 1950 to 2002. Lancet 2006; 367: 645.*
4. *Alter, MJ. Epidemiology of viral hepatitis and HIV co-infection. J Hepatol 2006; 44: S6–S9.*
5. *Blach S, Zeuzem S, Manns M, Altraif I, Duberg AS, Muljono DH, et al. Global prevalence and genotype distribution of hepatitis C virus infection in 2015: a modelling study. The lancet Gastroenterology & hepatology. 2017 Mar 1;2(3):161-76.*
6. *Garcia-Tsao G. Spontaneous bacterial peritonitis. Gastroenterol Clin North Am 1992;21:257-75.*
7. *Chaudhary IA, Khan SS, Majrooh MA, Alvi AA. Seroprevalence of hepatitis-B and C among the patients reporting in surgical OPD at Fauji Foundation Hospital, Rawalpindi: Review of 5 year literature. Pakistan Journal of Medical Sciences. 2007 Jul 1;23(4):514.*
8. *Bhamidimarri KR, Satapathy SK, Martin P. Hepatitis C virus and liver transplantation. Gastroenterology & hepatology. 2017 Apr;13(4):214.*
9. *Alavi M, Poustchi H, Merat S, Kaveh-Ei S, Rahimi-Movaghar A, Shadloo B, et al. An intervention to improve HCV testing, linkage to care, and treatment among people who use drugs in Tehran, Iran: The ENHANCE study. Int J Drug Policy. 2019 Oct 1;72:99-105.*
10. *Asif MF, Pervaiz Z. Socio-demographic determinants of unmet need for family planning among married women in Pakistan. BMC public health. 2019 Dec;19(1):1-8.*

11. *Grebely J, Dore GJ, Morin S, Rockstroh JK, Klein MB. Elimination of HCV as a public health concern among people who inject drugs by 2030–What will it take to get there?. J Int AIDS Soc. 2017;20(1):22146.*

12. *Doycheva I, Watt KD, Rifai G, Abou Mrad R, Lopez R, Zein NN, et al. Increasing burden of chronic liver disease among adolescents and young adults in the USA: a silent epidemic. Digestive Dis Sci. 2017 May 1;62(5):1373-80.*

13. *Dirchwolf M, Marciano S, Mauro E, Ruf AE, Rezzonico L, Anders M, et al. Clinical epidemiology of acute hepatitis C in South America. J Med Virol. 2017 Feb;89(2):276-83.*

14. *Mateu-Gelabert P, Guarino H, Quinn K, Meylakhs P, Campos S, Meylakhs A, et al. Young drug users: a vulnerable population and an underutilized resource in HIV/HCV prevention. Curr HIV?AIDS Rep. 2018 Aug;15(4):324-35.*

15. *Legoupil C, Peltier A, Henry Kagan V, Segouin C, Alberti C, de Massé L, et al. Out-of-Hospital screening for HIV, HBV, HCV and Syphilis in a vulnerable population, a public health challenge. AIDS Care. 2017 Jun 3;29(6):686-8.*

16. *Moreno GA, Wang A, González YS, Espinosa OD, Vania DK, Edlin BR, et al. Value of comprehensive HCV treatment among vulnerable, high-risk populations. Value Health. 2017 Jun 1;20(6):736-44.*

17. *Carvalho-Gomes Â, Cubells A, Pallarés C, Hontangas V, Conde I, Di Maira T, et al. A population-based screening for hepatitis C antibodies and active infection using a point-of-care test in a low prevalence area. PloS one. 2020 Feb 11;15(2):e0228351.*

18. *Sohail MM. Belief in God's help during hepatitis C: A qualitative study on Muslim patients in Pakistan. J Religion Health. 2020 Apr;59(2):928-45.*

19. *Ali I, Siddique L, Rehman LU, Khan NU, Iqbal A, Munir I, et al. Prevalence of HCV among the high risk groups in Khyber Pakhtunkhwa. Virol J. 2011 Dec;8(1):1-4.*

20. *Idrees S. Rising Trend of Hepatitis C: A Pakistani Perspective. J Nursing. 2014 Nov 1;4(4):16.*

21. *Memon MS, Zaki M. Burden of chronic liver disease and liver transplantation in Sindh. JLUMHS. 2013 Jan;12(1):1-2.*