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SEROPREVALENCE, RISK ASSOCIATIONS, AND TESTING COST OF SCREENING FOR HCV, HBV, AND HIV INFECTIONS AMONG A GROUP OF PRE-OPERATIVE EGYPTIAN PATIENTS

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Abstract. *Background.* Routine pre-operative testing for Human Immunodeficiency Virus (HIV) and other blood-borne viruses, Hepatitis B Virus, Hepatitis C Virus (HBV, HCV) has been stated as a strategy to reduce the risk of healthcare workers' infection by preventing and reducing their infection. However, the argument that screening is essential or not is strong. This study aims to determine the incidence of HBV, HCV, and HIV infections identified during pre-operative screening in a cohort of Egyptian individuals, along with the associated risk factors and the subsequent testing costs. *Materials and methods.* This study comprised 138 patients, with 92 (66.7%) males and 46 (33.3%) females. All patients scheduled for surgical procedures underwent testing for HCV Ab, HBsAg, and HIV Ag/Ab by chemiluminescent microparticle immunoassay conducted with the "ARCHITECT i2000SR Immunoassay" (Abbot Japan CO., Ltd, Tokyo, Japan). Among the participants, 23 out of 138 (16.7%) tested positive for HCV, while 5 out of 138 (3.3%) showed equivocal results for HCV, and 110 out of 138 (79.7%) tested negative for HCV. Additionally, 2 out of 138 (1.4%) were positive for HBsAg, while 136 out of 138 (98.6%) tested negative for HBsAg. Furthermore, 1 out of 138 (0.7%) was found to be HIV-positive, while 137 out of 138 (99.3%) tested negative for HIV. *Results.* The prevalence of each infection detected through pre-operative testing of HCV, HBV and HIV and a questionnaire was compared. Furthermore, we calculated the screening cost per confirmed infection by assessing the incidence of infections linked to different risk factors, ages, genders, and levels of HBV vaccination. *Conclusions* Age markedly impacted HCV and HBV rates. There was no link between viral infections and gender. The expenses associated with each affirmative result were 1763 LE for HCV, 5520 LE for HBV, and 22 080 LE for HIV. While self-assessment through questionnaires can be partially efficacious, it lacks sufficient screening accuracy.

Key words: *HCV, HBV, HIV, pre-operative testing, screening cost, viral infections.*

СЕРОРАСПРОСТРАНЕННОСТЬ, АССОЦИАЦИИ РИСКА И СТОИМОСТЬ СКРИНИНГА НА ИНФЕКЦИИ ВГС, ВГВ И ВИЧ У ПРЕДОПЕРАЦИОННЫХ ПАЦИЕНТОВ В ЕГИПТЕ

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Резюме. Плановое предоперационное тестирование на вирус иммунодефицита человека (ВИЧ) и другие вирусы, передающиеся гематогенно, такие как вирус гепатита В, вирус гепатита С (ВГВ, ВГС), было предложено как стратегия снижения риска инфицирования работников здравоохранения путем профилактики и снижения их инфицирования. Однако существенным остается вопрос о необходимости проведения подобно-

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го скрининга. Настоящее исследование направлено на определение заболеваемости инфекциями ВГВ, ВГС и ВИЧ, выявленными во время предоперационного скрининга в группе пациентов в Египте, а также связанных с ними факторов риска и последующих затрат на тестирование. *Материалы и методы.* В исследование включены 138 пациентов, из которых 92 (66,7%) мужчины и 46 (33,3%) женщины. Все пациенты, которым были назначены хирургические манипуляции, прошли тестирование на антитела к вирусу гепатита С, HBsAg и антитела к ВИЧ Ag/Ab с помощью хемилюминесцентного иммуноанализа на микрочастицах, на приборе «ARCHITECT i2000SR» (Abbot Japan CO., Ltd, Токио, Япония). Среди участников 23 из 138 (16,7%) дали положительный результат на вирус гепатита С, в то время как 5 из 138 (3,3%) показали сомнительные результаты на вирус гепатита С, а 110 из 138 (79,7%) дали отрицательный результат на вирус гепатита С. Кроме того, 2 из 138 (1,4%) дали положительный результат на HBsAg, в то время как 136 из 138 (98,6%) дали отрицательный результат на HBsAg. Кроме того, 1 из 138 (0,7%) оказался ВИЧ-положительным, в то время как 137 из 138 (99,3%) дали отрицательный результат на ВИЧ. *Результаты.* Проведено сравнение распространенности каждой инфекции, выявленной с помощью предоперационного тестирования на ВГС, ВГВ и ВИЧ и анкетирования. Кроме того, были рассчитаны стоимость скрининга на подтвержденную инфекцию, оценив частоту инфекций, связанных с различными факторами риска, возрастом, полом и охватом вакцинации против ВГВ. *Выводы.* Возраст заметно влиял на показатели распространенности ВГС и ВГВ инфекции. Связи между вирусными инфекциями и полом не установлено. Расходы, связанные с каждым положительным результатом, составили 1763, 5520 и 22 080 египетских фунтов для ВГС, ВГВ и ВИЧ соответственно. Хотя самооценка при анкетировании может быть частично эффективной, она не обеспечивает достаточной точности скрининга.

Ключевые слова: *ВГС, ВГВ, ВИЧ, предоперационное тестирование, стоимость скрининга, вирусные инфекции.*

Introduction

In recent years, Egypt has been estimated to be one of the countries with the highest HCV incidence globally. Anti-HCV testing revealed that 6% of individuals aged 1–59 years had a positive result, and 4% were determined to be suffering from an active infection with higher prevalence in males among most age groups except in children [1, 13]. In past years, Egypt was considered one of the highest countries in HCV prevalence but starting 2018/2019, Egypt started applying screening, diagnosis and treating HCV patients to achieve HCV control and eliminating infection by 2030 [1, 26]. HBV infection in Egypt is a significant public health issue [8]. According to research, the estimated national prevalence was 3.67% [95% CI: 3: 4.39). With a history of HBV immunization during infancy, children under 20 had the lowest prevalence (0.69%). Pregnant women, blood donors, and healthcare professionals had combined prevalence rates of HBV infection of 2.95%, 1.8%, and 1.1%, respectively. The largest prevalence was seen in patients with hemolytic anemia and hemodialysis, cancer patients, patients with HCC, and patients with chronic liver disease (6.34%, 25.5%, 18.6%, and 34%, respectively). Research comparing the prevalence of HBV in urban and rural areas found that the rates were similar, at 2.43% and 2.15%, respectively [8].

HIV prevalence rates in Egypt are estimated to be 0.1 percent in the general population. Nevertheless, United Nations agencies such as UNAIDS and UNICEF, along with stakeholders within the Egyptian National AIDS Program (NAP), express concerns regarding a potentially significant increase [10]. HIV-positive individuals have been identified in an increasing number of studies conducted globally [12, 33]. The prevalence of HIV among the general population remains low in Egypt. That is supported by data from HIV testing services (HTS) provided to pregnant women. However, Egypt continued to witness an increasing trend of HIV new infection and incidence rate, which is reflecting a rapidly evolving disease spread. The incidence rate has increased by five folds between 2010 and 2019. In 2019, men (mainly young men aged between 15 and 24 years) had the highest HIV new infections compared to women. There was a rapid increase in the estimated number of adults and children living with HIV in the country during the period 2015 and 2020. UNAIDS Estimated around 24 000 People Living with HIV by end of 2020 in Egypt. Programmatic data on HIV testing and surveillance continue to indicate that specific population groups are increasing risks of new HIV infections. People who inject drugs (PWID) and other men who engage in sex with men (MSM) are at higher risk of HIV infection than other population groups. Despite the focus on PWIDs and MSM, data from HIV testing and assessments indicate the significance of other population groups at risk of HIV infection due to specific risk factors [6].

From the previous data, preventing and limiting viral infection spread and transmission is crucial, especially among medical health workers (HCW) and staff. According to estimates from the World Health Organization (WHO), over 3 million healthcare workers sustain injuries annually from contaminated edges with at least one form of HIV (~170 000 exposures), hepatitis B (~2 000 000 exposures), or hepatitis C (~900 000 exposures). The only available method of prevention for HCV currently is the use of normal precautions along with rigorous attention to post-exposure prophylactic measures. This is because there is currently no immunization against HCV [24].

As for HBV infection, HCW are at increased risk of hepatitis B virus (HBV) infection because of their frequent exposure to blood and other body fluids. Once infected, HCW may transmit HBV to their patients [14, 19, 28].

Globally, Europe (0.6–1.2%) and several Asian nations (India, Iran, Turkey, and the United Arab Emirates, for example) were reported to have low rates of hepatitis B infection among HCW [3, 15, 21, 27]. Nonetheless, some Asian nations (up to 9.85%) and African nations (2.3–11.8%) had significantly greater prevalence [16, 20]. Vietnam had the highest incidence in Asia.

In HCW in Cameroon, Mauritania, Sierra Leone, and Tanzania, an alarmingly high incidence rate of > 8.7% of HBsAg has been recorded.

In Egypt, a study showed that 0.4% of HCW were positive for HBsAg and 15.6 for anti-HBc [17].

As for HCV infection, HCV infection prevalence among Egyptian HCW was estimated to be around 8% [7, 25], another study reported that, out of 1000 studied HCWs, 90 cases (9%) were positive for hepatitis C antibody (HCV Ab) and 53.70% of all HCW exposed to needle sticks injury (NSI) [6].

As for HIV, prevalence rates in Egypt are estimated to be 0.1 percent in the general population.

Pre-operative monitoring for HIV and the hepatitis virus is now pervasive in medical facilities. A significant concern for the economy's well-being and clinical management is the administration of non-essential and irregular pre-operative blood tests before elective surgery.

However, the argument that screening is essential or not is strong. Routine pre-operative HIV and other blood-borne viruses (HCV and HBV) checking is defined as an approach to reduce the risk of healthcare workers' infection by preventing and reducing their infection. Moreover, after a sharp injury, the surgeon and healthcare workers would know whether to begin post-exposure prophylaxis immediately. Furthermore, it is critical to determine whether or not to increase the use of personal protective equipment (PPE) as an additional precaution throughout operations. Additionally, it assists surgeons in organizing their surgery schedule and prioritizing patients in the correct order. However, this aids surgeons in determining the necessary environmental sterilization and apparatus to be utilized after each procedure [17].

Regarding patients, it has been proposed that regular pre-operative testing for HIV, HBV, and HCV could be advantageous by enabling the identification of undetected cases and the timely management of those cases before manifesting liver cancer, cirrhosis, or AIDS [12, 29, 32].

Research has indicated that a significant portion of the concerns surrounding the spread of infections could be mitigated by implementing universal precautions instead of universal screening; this represents the primary critique of the universal screening approach. However, the maximum significance of universal precautions is preventing blood contact through barrier protection. However, the risk of gaining infection is higher with needle stick injury (NSI), where barrier precautions are unavailing [2].

Despite specific precautions to prevent infection as wearing protective gloves, googles and cloth, providing sinks for hands washing, providing appropriate treatment and prophylactic IVIgG and raising the awareness of HCW on how to deal after exposure, still the risk of gaining infection is higher with needle stick injury (NSI) and exposure to injury with sharp objects.

This research investigates the impact of pre-operative screening on HIV, HCV, and HBV infection rates in Egyptian individuals, evaluating risk correlations and checking costs, self-reported positivity rates, and hepatitis incidence by gender and age.

Materials and methods

The Faculty of Medicine Ethics Committee at Cairo University has approved the research (#N-280-2023). The study corresponded with the principles of the Declaration of Helsinki. All participants provided informed consent before enrollment.

The study was conducted on 138 patients undergoing elective operation in King Fahd Unit Al-Kasr Al-ainy Hospitals, Cairo University. Immunocompromised patients and patients under corticosteroids or immunosuppressant medications were excluded.

Patients were subjected to a questionnaire discussing their entire history, kind of upcoming elective operation, job, HBV vaccination state, risk factors including previous operation, drugs, blood transfusion, organ transplantation, previous endoscopy or catheter, tooth manipulation, professional risk, and sharing personal tools. Clinicians in the King Fahd unit in Cairo University hospitals performed clinical examinations of patients, data of the patients are discussed in Table 1 in [29].

A peripheral venous blood sample was collected to detect HCV antibodies, HBsAg and HIV antigen/antibody using a chemiluminescent microparticle immunoassay conducted with the "ARCHITECT i2000SR Immunoassay" (Abbott Japan CO., Ltd, Tokyo, Japan), kits used for HCV ab are ARCHITECT, Lot (57289BE00), for HBsAg Lot (59411FZ00) and for HIV antigen/antibody Lot (60457BE00).

All patients whose findings for HIV Ag/Ab > 1.0 S/CO, HBsAg > 1.0 S/CO) was reported as positive for HIV and HBV, respectively.

For HCV Ab, patients whose findings were < 1.0 S/CO was reported as negative and from 1 to 5 S/CO was reported equivocal and positive > 5 S/CO.

Statistical methods. Data analysis was conducted using SPSS version 21. Qualitative data were present-

ed using numbers and percentages, while quantitative data were presented using means and standard deviations. Significance testing included parametric and non-parametric tests: chi-square with Fisher's exact test for qualitative data, Student's t-test and ANOVA for parametric normally distributed data, and the Bonferroni test for post hoc analysis. The significance level was set at a p-value ≤ 0.05.

Cost analysis. In the context of testing cost analysis, the cost associated with identifying patients with cleared or active viral loads was determined by multiplying the test cost by the number of patients and then dividing the result by the number of positive cases. This process enabled the computation of the testing expense.

Results

A total of 138 patients participated in this study, comprising 92 (66.7%) males and 46 (33.3%) females. The mean age was 50.20, with a standard deviation of 17.05 (with 10 years old minimum age and 87 years old maximum age). Data regarding previous HBV vaccinations, upcoming operations, occupations, and infection risk factors are presented in Table 1.

Viral screening test counts and positivity rates. All patients scheduled for upcoming surgical procedures underwent testing for HCV, HBV, and HIV. Among the 138 patients, 23 (16.7%) tested positive for HCV, while 5 (3.3%) showed equivocal results for HCV, and 110 (79.7%) tested negative for HCV. Additionally, 2 (1.4%) tested positive for HBsAg, while 136 (98.6%) tested negative. Furthermore, 1 (0.7%) patient was found to be HIV-positive, while 137 (99.3%) were negative for HIV. These findings are summarized in Table 2.

Investigating self-reported positivity rate of patients. All HCV cases known to be infected tested seropositive, whereas 12.9% of cases known not to be infected tested seropositive and 3.7% tested equivocal, with a significance level of p-value < 0.001, as shown in Table 3.

Regarding HBV infection, 75% of known infections tested negative for HBsAg, while 0.7% of cases known not to be infected tested positive for HBsAg, with a significance level of p-value < 0.001, as illustrated in Table 4.

As for HIV infection, no statistically significant difference was detected (Table 5).

Association between age, gender, HBV vaccination state, and different risk factors for HCV infection. A statistically significant difference was observed regarding HCV infection status and age, with a higher prevalence noted in older age groups (p-value = 0.018), as indicated in Table 6.

Statistically significant difference between positive cases in young age and negative cases in older age by P value 0.035. No statistically significant difference between age and HIV infection.

A statistically significant difference was observed between HCV-positive cases vaccinated with the HBV vaccine (36.4%) compared to those not vaccinated (12.9%), with a p-value of 0.008. However, no statistically significant differences were detected between gender, occupation, various risk factors, and HCV infection.

Association between age, gender, HBV vaccination state, and different risk factors with HBV infection. A statistically significant difference was found regarding HBV infection status and age, with a higher prevalence observed in younger age groups (p-value = 0.035). Additionally, a statistically significant difference was detected between positive HBsAg cases and previous blood transfusions (p-value = 0.026). However, no other statistically significant differences were observed between gender, occupation, HBV vaccination status, or any other listed risk factors, as shown in Table 7.

Association between age, gender, HBV vaccination state, and different risk factors for HIV infection. No statistically significant differences were detected between HIV infection state and age, gender, job, HBV vaccination state, and other risk factors.

Cost analysis. All screening tests for HBV, HCV and HIV cost: 56 442 LE, as for HBV cost was 16 560 LE; HCV cost was17 802 LE and HIV cost was 22 080 LE. A total of 138 patients were screened, cases with positive results for all viral infections cost was: 4132 LE. HBV positive cases cost 360 LE; HCV positive cases cost 2967 and 645 LE for equivocal while For HIV positive cases the cost was 160 LE.

Cost analysis for all screening test was 56 442/27 positive cases =2090.4 LE (with equivocal HCV results = 56 442/32 = 1763 LE) for HBV = 16 560/3 positive cases =5520 LE/positive case. For HCV= 17 802/23 positive cases = 774 LE/ positive cases (HCV with equivocal 17 802/28 = 635.8 LE per non-negative case) and for HIV = 22 080/1 = 22 080 LE per positive case. So, HCV is the most efficient screening among all, followed by HBV.

Discussion

In this study, the prevalence of HBV, HCV, and HIV in a group of Egyptian patients scheduled to undergo operations at King Fahd Unit Cairo University was investigated. The respective prevalence rates for HCV, HBV, and HIV were 16.7%, 1.4%, and 0.7%. Age was a crucial determinant influencing HCV and HBV exclusively; gender had no discernible effect on HCV, HBV, or HIV. The self-reported positivity rates of HCV are 100%, as all known infections are seropositive, but 12.9% of those known not to be infected are seropositive, and 3.7% are equivocal. In the case of HBV, 75% of individuals known to be infected are HBsAg negative. For patients with a history of infection, HBsAg negative cases should undergo investigation for HB core total and HBsAb to assess their HBV infection status. However, for screening purpos-

Table 1. Demographic characteristics of the patients

			Frequency (N)	Percent (%)
Gender	**male**		92	66.7
	female		46	33.3
HB vaccine	**no**		116	84.1
	yes		22	15.9
Job	**no or housewife**		45	32.6
	employee		14	10.1
	skillful worker		17	12.3
	worker		20	14.5
	retired		22	15.9
	student		10	7.2
	farmer		8	5.8
	health care worker		2	1.4
	Total		138	100.0
Upcoming operation	**stones**		36	26.1
	endoscopy		68	49.3
	stint		6	4.3
	biopsy		1	.7
	open surgery		26	18.8
	renal donation		1	.7
	Total		138	100.0
Risk factors for infection	**Drugs**	**no**	113	81.9
		smoking	21	15.2
		cannabinoids	2	1.4
		tramadol	1	.7
		past history	1	.7
	Previous operation	**yes**	107	77.5
	Blood transfusion	**yes**	24	17.4
	Organ transplantation	**no**	138	100.0
	Previous endoscopy catheter	**yes**	59	42.8
	Tooth manipulation	**yes**	106	76.8
	Professional risk	**yes**	106	76.8
	Sharing personal tools	**yes**	10	7.2
	Total		138	100.0

Table 2. HCV Ab, HBsAg and HIV Ag/Ab results

	HCV Ab (n = 138)		**HBsAg (n = 138)**		**HIV Ag/Ab (n = 138)**	
Positive	23	16.7	2	1.4	1	0.7
Negative	110	79.7	136	98.6	137	99.3
Equivocal	5	3.3	–	–	–	–

Table 3. Investigating self-reported positivity rate of patients (HCV)

			HCV Ab result			**Total**	**P value**
			Negative	**Positive**	**Equivocal**		
Known HCV	**no**	**Count**	110	17	5	132	0.001
		% within HCV Ab	83.3%	12.9%	3.7%	100.0%	
	yes	**Count**	0	6	0	6	
		% within HCV Ab	0.0%	100.0%	0.0%	100.0%	
Total		**Count**	110	23	5	138	
		% within HCV Ab	79.7%	16.7%	3.6%	100.0%	

es, a positive history is sufficient to warrant precautions. 0.7% of known not to be HBV-infected cases are HBsAg positive, and for HIV, the only positive case did not know about the presence of infection. Despite the small number of HIV-positive cases, it is essential to know the patient's condition before entering the operation to protect the surgeons and medical staff from the danger of virus transmission because of the threat it poses to their lives and the future of medical staff.

The corresponding prevalence rates for HCV, HBV, and HIV were 16.7%, 1.4%, and 0.7%. Ahmed A Dahab et al. [11] reported concordant rates for HCV, HBV (12.4%) (0.2%), respectively with higher HCV rates. As for HIV, Amgad Ali et al. [5] reported a rate of (0.15%), these results support higher HCV rate of infection compared to HBV rate of infection and lower HIV rates in Egypt. Takata et al. reported lower rates of HCV infections (5.8%) and higher HBV rates (2.1%) in Japan compared to the current study [22]. Another study by Shintaro Sukegawa et al. [30] in Japan demonstrated lower rates for HCV (0.76%), HBV (0.39%), and HIV (0.07%) compared to the current findings. Another study in India by Manjul Mohan et al. [23] reported rates of HBV infections (2.09%), Hepatitis C virus infection rate (1.77%) with higher HBV rates compared to our results, HIV sero-positivity was found to be (0.25%) which is concordant with our study. Moreover, Akhtar Khan and Taranum Siddiqui [18] reported in Pakistan 1.8% subjects were found to be Hepatitis B positive, 1.2% subjects were found to be Hepatitis C positive with higher HBV rates compared to our results.

The outcomes of this work exhibit that gender does not have a significant impact on HBV, HCV, or

Table 4. Investigating self-reported positivity rate of patients (HBV)

			HBsAg results		Total	P value
			Negative	Positive		
Known HBV	no	Count	133	1	134	0.001
		% within HBsAg	99.3%	0.7%	100.0%	
	yes	Count	3	1	4	
		% within HBsAg	75.0%	25.0%	100.0%	
Total		Count	136	2	138	
		% within HBsAg	98.6%	1.4%	100.0%	

Table 5. Investigating self-reported positivity rate of patients (HIV)

			HIV Ag/Ab result		Total	P value
			Negative	Positive		
Known HIV	no	Count	137	1	138	Cannot be calculated
		% within HIVAg/Ab	100.0%	100.0%	100.0%	
Total		Count	137	1	138	
		% within HIVAg/Ab	100.0%	100.0%	100.0%	

Note. Odds ratio and p value can't be calculated.

Table 6. Association between age and HCV infection state

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum	P value
					Lower Bound	Upper Bound			
Negative	110	48.109	16.2827	1.5525	45.032	51.186	10.0	87.0	0.015
Positive	23	58.783	17.7839	3.7082	51.092	66.473	19.0	80.0	
Equivocal	5	56.800	19.8671	8.8848	32.132	81.468	22.0	70.0	
Total	138	50.203	17.0504	1.4514	47.333	53.073	10.0	87.0	

Table 7. Association between age and both HBV and HIV infection state

HBsAg result	N	Mean	Std. Deviation	P value
Positive	2	25.000	8.4853	0.035
Negative	136	50.574	16.8802	
HIV Ag/Ab result	N	Mean	Std. Deviation	P value
Positive	1	59.000		0.606
Negative	137	50.139	17.0963	

HIV. However, these results contradict Amgad Ali et al. [5] reporting a higher HIV prevalence among males in Egypt. Moreover, Shintaro Sukegawa et al. [30], Tanaka et al. [31] and Manjul Mohan et al. [23] demonstrated that gender and age do have a significant influence on hepatitis, with younger men being more susceptible, these results contradict the current study results. These researchers attributed this to the higher prevalence of sexual activity among youth compared to older adults. Akhtar Khan and Taranum Siddiqui reported that Hepatitis B positive cases 61.5% were males and 38.4% were females with higher male rates contradicting our study while 1.2% subjects were found to be Hepatitis C positive, out of these 50% were males and 50% were females, this result agree with the current study result [18].

In the current work, a statistically substantial difference was detected regarding the HBV state of infection and age being higher in younger ages with a p-value of 0.035. This finding aligns with the results of Shintaro Sukegawa et al. [30], Tanaka et al. and Manjul Mohan et al. [12, 23].

For HCV, a statistically significant difference was detected regarding the state of infection and age being higher in older age with a p-value of 0.018. However, this result contrasts with Shintaro Sukegawa et al. and Tanaka et al. [12], as infection was more prevalent at a younger age. This difference may be related to the Egyptian government's effort and plan to eliminate the transmission of the virus, and this plan started years ago. As for HIV, there is no statistically significant difference between age and infection rate, these results contradict Amgad Ali et al. who reported high HIV prevalence among young persons and males, with high HIV prevalence among unemployed persons, manual workers and single persons [5].

This study detected a relationship between HBsAg-positive cases and previous blood transfusions, which are major risk factors for transmission. However, this agrees with the survey conducted by Candotti and Pierre [4].

Binkaa et al. [9] mentioned intravenous drug addiction as a significant risk factor for HBV, HCV, and HIV infection, but in the current study, there were no statistically significant differences between drug addiction and infections. However, this is due to the restriction of the type of addiction to oral tramadol and cannabinoids.

All screening tests incurred a cost of 56 442 LE. Specifically, HBV screening costs 16 560 LE, HCV screening costs 17 802 LE, and HIV screening costs 22 080 LE.

In this study, the cost analysis showed that out of 138 screened patients, the total cost for cases with positive results for all viral infections was 4132 LE.

HBV-positive cases cost 360 LE; HCV-positive cases cost 2967 LE and 645 LE for equivocal, while for HIV-positive cases, the cost was 160 LE. Cost analysis for all screening tests was 56 442/27 positive cases = 2090.4 LE (with equivocal HCV results = 56 442/32 = 1763 LE) for HBV = 16 560/3 positive cases = 5520 LE/positive case. HCV = 17 802/23 positive cases = 774 LE/ positive case (HCV with equivocal 17 802/28 = 635.8 LE per non-negative case), HIV = 22 080/1 = 22 080 LE per positive case. However, this data indicates that HCV is the most efficient screening, followed by HBV.

Sukegawa et al [30] determined that the aggregate expenditure for HCV, HBV, and HIV screening amounted to 16 630 950 yen ($138 591.3), 13 904 960 yen ($116 174.7), and 14 274 400 yen ($118 953.3), correspondingly. Screenings were conducted on 15 839, 15 842, and 12 745 cases, respectively, with HCV, HBV, and HIV infections. The cost per positive outcome for HBV (total HBV testing expense: 13 940 960 yen/62 positive cases), HCV (total HCV testing expense: 16 630 950 yen/153 positive cases), and HIV (HIV screening total expense: 14 274 400 yen/10 positive cases) was 224 854.2 yen ($1873.8), 108 699.0 yen ($905.8), and 1 427 440 yen ($11 895.3), respectively. This result is in substantial agreement with the current findings, as it suggests that while the expense per positive outcome was beneficial for hepatitis, it was comparatively less effective for HIV.

Conclusion

In conclusion, our study investigated the prevalence of HBV, HCV, and HIV in patients scheduled for surgical operation in King Fahd unit Al-Kasr Al-ainy hospital Cairo University. The prevalence of HBV, HCV, and HIV was 1.4, 16.7, and 0.7%, respectively. Patients-assessment using questionnaires may be effective to some extent, but the screening accuracy was inadequate. Age was a significant factor affecting HBV and HCV, while gender does not affect infection state. The cost per positive result was useful for hepatitis, but less useful for HIV.

The current study should be expanded to include a larger sample size. Additionally, it is advisable to compare the cost per test with the cost of universal precautions. However, the current study did not include this comparison due to challenges in collecting data and determining the exact cost of these precautions.

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