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A cross-sectional study to evaluate the health status of hospital support staff in Ahemdnagar, Maharashtra, India

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ABSTRACT

Introduction

Quality of life in biomedical disciplines corresponds to 'health-related quality of life' (HRQOL), concerning those aspects of quality of life that are related to health and disease and can thus be addressed by medical science. Among healthcare workers (HCWs), factors including shift work, ageing and work-related stress may lead to impaired health. Such risk factors may intersect, increasing the potential harm to health. The objective of this study was to evaluate the health status of hospital support staff, including Class 4 healthcare workers; ward boys; attendants and cleaners in Dr. Vithalrao Vikhe Patil Foundation's Medical College and Hospital, Ahmednagar, India; and to evaluate the incidence of anaemia, HIV and Hepatitis B infection in these workers.

Methods

We conducted a single site cross-sectional study of 100 hospital support staff. Basic laboratory investigations were carried out, including Complete Blood Count (CBC), Liver function Tests (LFT), Renal Function Tests (RFT), Sugars, Human Immunodeficiency Virus (HIV) tests & Hepatitis B Surface Antigen (HbsAg) tests.

Results

Out of 100 participants, 48 were male and 52 female, with a mean age of 38± 11.5 years. Of these, 45% had anaemia (45%). The mean concentration of Hb was 11.70 ± 1.98 g/dl and 11% participants had a raised blood sugar level (mean blood sugar level 124.06±74.31). Level of serum glutamic- oxaloacetic transaminase (SGOT) was 38.80±33.82, IU/L and the level of serum glutamic- pyruvic transaminase (SGPT) was 31.86±17.37 IU/L. The mean direct bilirubin was 0.35±0.31 mg/dl and 2% of the participants were HbsAg positive.

Conclusion

HCWs are at significantly higher risk for developing some diseases due to the nature of their work. We must prioritize annual health screenings, complete vaccination schedules for vaccine-preventable diseases to which they might be exposed and implement strict infection control policies to sustain their health and work capacity.

Keywords: Health check-up, Hospital support staff, Occupational health

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INTRODUCTION

The Global Burden of Disease from preventable occupational diseases has become a serious problem worldwide. Disease burdens are increasing every year in both developing and developed countries. Globally, two million people die each year[1] as a result of occupational accidents, work-related injuries and illness. Annually, work-related diseases are estimated to affect 160 million people,[2] of whom approximately 58 million are absent for an average four workdays per year as a result of this. Workplace death, injury and disease costs approximately 4% of annual GDP, as a global average.[3] In April 2019, the International Labour Organization (ILO) estimated the mortality rate to be even higher than the official figure: they believe nearly 3 million workers worldwide die each year due to occupation-related diseases or accidents, and another 374 million people are injured in occupation-related accidents.[4]

Worldwide, healthcare workers (HCWs) make up 12% of the global workforce[5] and face high occupational risk. Occupational health is a neglected public health issue among healthcare workers in developing countries. Many are exposed to various hazards that have negative consequences on their wellbeing, health and work performance.[6-8] HCWs who attend to others' health may encounter risks from strenuous manual labour, infectious diseases, chemical hazards and irrational or violent patients.[9-12] Healthcare workers without appropriate personal protective equipment (PPE) risk catching diseases such as those caused by the hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV)[13] (this study was conducted pre-COVID-19, and so does not specifically consider Covid-19 in the discussion, though the HCWs are equally at risk).

The trend is not restricted to infectious diseases alone. Several studies have found that HCWs fare no better when it comes to conditions such as diabetes, hypertension, liver dysfunction and anaemia.[14] HCWs experience high psychosocial strain and are at increased risk of sickness causing absenteeism, early labour market exit, musculoskeletal problems. Due to their unhealthy lifestyle, they may also be at an increased risk of developing diabetes mellitus.[15]

As a number of studies have reported on the disease burden from occupational hazards, it is sensible to consider annual health checkups for HCWs to detect early abnormalities. The management team of Dr. Vithalrao Vikhe Patil Foundation's Medical College and Hospital, Ahmednagar, India has set up such an annual health check-up programme for all HCWs at the hospital. The programme includes routine laboratory tests followed by consultation with a specialist as required. We carried out this study to evaluate the health status of hospital support staff, including class 4 HCWs; ward boys; male and female health attendants, cleaners and sanitation workers, as recorded by this annual check-up. A second objective was to evaluate the incidence of anaemia, HIV and Hepatitis B infection, and other laboratory parameters recorded amongst the study participants.

HCWs are exposed to patients' blood as well as other body fluids (OEB) by direct contact with patients and may also suffer from needlestick injuries and sharp object damage.[16] This puts them at high risk of infection with the Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV), which are responsible for the two most widespread forms of chronic hepatitis worldwide. HCWs risk acquiring HBV and HCV infection through mucosal-cutaneous exposure to potentially infectious blood or blood products or through percutaneous exposure to contaminated sharps.[17] HCWs are also at a risk for occupational acquisition of HIV infection, primarily due to percutaneous exposure to infected blood through needle pricks with contaminated needles, cuts from sharp instruments and blood splashes to the conjunctiva. Appropriate vaccination, as well as pre- and post- exposure prophylaxis can greatly reduce the risk and should be carried out to protect HCWs.[18]

METHODS AND MATERIALS

We carried out a descriptive, cross-sectional study conducted over three months between January–March 2020 on hospital and medical college support staff working at Dr. Vithalrao Vikhe Patil Foundation's Medical College and Hospital, Ahmednagar, India. 100 workers were chosen by universal sampling technique. A written informed consent was obtained

from each participant. Institutional Ethics Committee clearance was obtained before starting the study.

Basic laboratory investigations were undertaken, including Complete Blood Count (CBC), Liver Function Tests (LFT), Renal Function Tests (RFT), Sugars, tests for presence of Human Immunodeficiency Virus (HIV) and Hepatitis B Surface Antigen (HbsAg). Data were collected using a semi-structured pre-tested questionnaire and were entered in a Microsoft Excel 2013 spreadsheet. Data are represented in Tables 1-4 as frequencies and percentages. Mean and standard deviation of quantitative variables is shown. Chi square test was used to test association between the study parameters, with a p-value of <0.05 considered statistically significant.

The abnormalities were defined as follows: anaemia as Hb <12% in females and <13% in males; impaired random blood sugar >160mg/dl; suspected Diabetes Mellitus (DM) >200mg/dl; Hepatitis B HbsAg positive + deranged LFTs; Serum SGPT or SGOT > 55 IU/L, significant elevation of Serum Glutamic Pyruvic Transaminase (SGPT) or Serum Glutamic Oxaloacetic Transaminase (SGOT) if the value is above 45 IU/L (HBV, HCV carrier state); HIV status as reactive HIV I and HIV II (immuno-chromatography); impaired renal function was defined by raised serum creatinine.

RESULTS

Out of the total 100 participants 48 were male (48%) and 52 were female (52%). See Table 1). The mean age for males was 36 ± 3 years. Mean age for females was 39.5 ± 10 years. Mean age of all participants was 38 ± 11.5 years. The male to female ratio was 0.9:1. Nearly two-thirds (65%) worked in the hospital, 26% in the medical college and 9% in the hostel.

Results of the complete blood count showed that the mean concentration of Hb among the participants was 11.70 ± 1.98 g/dl, which is significantly lower than the normal concentration. (Ref. range: 13.0-18.0 g/dl). Out of 100 study participants, 45% were anemic and 55% were not anemic. 37 out of 52 females were anemic (71%) and 8 out of 48 males were anemic (17%). These figures are consistent with the national as well as regional averages.

There was a significant association between gender and presence of anaemia, with females found to be more anaemic than males. ($p<0.001$) (Pearson Chi^2 test = 29.94, df = 1, $p < 0.001$ – significant). The mean TLC was 7.58±1.40 x10^3/µL (ref. range: 4.5-11.0 x10^3/µL). Similar findings have previously been observed in other studies. The mean platelet count was 303.45±71.81 x10^6/µL (Ref. range: 150-450 x10^6/µL, see Table 2).

Results of the liver function tests showed that the mean total bilirubin was 0.85±0.57 mg/dl. (ref. range: 0.5-1.5 mg/dl). The mean direct bilirubin was 0.35±0.31 mg/dl, which is slightly elevated (ref. range: 0.0-0.4 mg/dl) and the mean indirect bilirubin was 0.50±0.31 mg/dl. (Ref. range: 0.0-1.0 mg/dl) 00.12 (See Table 3).

Mean aspartate transaminase-serum (SGOT) was 38.80±33.82 IU/L (ref. range: 0-45IU/L); mean alanine transaminase-serum (SGPT) was 31.86±17.37IU/L (ref. range: 5-45 IU/L) and mean alkaline phosphatase-serum (ALP) was 92.721±27.823U/L (ref. range:60-170 U/L).

Results of the renal function tests (RFT) showed that the mean blood urea level was 24.10±6.26 mg/dl (ref. range: 15-45 mg/dl). The mean serum creatinine was 0.83±0.15 mg/dl (Ref. range: 0.6-1.4 mg/dl). The mean BUN was 11.88±3.37 mg/dl (Ref. range: 7-23 mg/dl).

Results of the random blood sugar-plasma (glucose oxidase-peroxidase) showed that out of 100 study participants 11% had a raised blood sugar level while 89% had a normal blood sugar level. The mean random blood sugar level was 124.06±74.31 (ref. range= 60-160 mg/dl).

The serology results showed that out of 100 study participants, 2% tested positive for HbsAg while 98 98% tested negative. Participants with positive HbsAg had serum SGPT and SGOT <45 IU/L (normal; no active disease). The individual who tested positive were referred to the Department of Medicine for further counselling and appropriate treatment. All of the participants had a non-reactive HIV I and II immunochromatography test, indicating that none of them were infected with HIV.

Table 1 Distribution of the study participants according to age and gender

Age groups (Yr)	Males	Females	Total
≤ 20	7	0	7
21 to 40	22	32	54
41 to 60	19	20	39
Total	48	52	100
Mean & SD	36 ± 13	39.5 ± 10	38 ± 11.5

Table 2 Distribution of participants based on mean values of the Complete Blood Count (CBC)

Descriptive	Mean	SD
Hb (g%)	11.70	1.98
TLC (Thousands)	7.58	1.40
Platelets (Thousands)	303.45	71.81

Table 3 Distribution of study participants: relationship between gender and incidence of anaemia

Gender	Anaemia n=	No anaemia n=	Total n=
Males	8	40	48
Females	37	15	52
Total	45	55	100

Table 4 Distribution of study participants based on results of Liver Function Tests (enzymes)

Descriptive	Mean	SD
Serum Aspartate transaminase (SGOT)	38.80	33.82
Serum Alanine transaminase (SGPT)	31.86	17.37
Serum Alkaline phosphatase (ALP)	92.72	27.82

DISCUSSION

Healthcare workers (HCWs) deliver care and services to sick and ailing patients either directly as doctors and nurses or indirectly as Class 4 HCWs, assistants, technicians, aides or medical waste handlers. There are approximately 59 million HCWs worldwide. The healthcare industry is a hazardous environment to work in as employees are constantly exposed to a complex variety of health and safety hazards,[14] ranging from biological exposure to disease-causing organisms such as *Mycobacterium tuberculosis*, HBV, HCV and HIV, or exposure to chemicals such as glutaraldehyde and ethylene dioxide. As well as physical hazards such as exposure to radiation and noise, there are also ergonomic issues such as heavy lifting and standing for long periods. Long working hours and shift work, along with poor dietary habits, add to the stress associated with this work. An annual health check-up has been identified as one of the most important health strategies, as it may detect some abnormalities or early stages of diseases that have no obvious symptoms, and is therefore recommended for those at high risk.[14]

Recorded rates of HbsAg positivity (reactivity to Hepatitis B virus) in HCWs range from 0.1% - 8.1%[19-25]. In our study, the rate of HbsAg positivity was found to be 2%, which is within the range recorded in the previous findings. While seroprevalence among HCWs was lower than the patient population, which was found to be between 2.25-2.8 %,[26,27] all HCWs should be considered for HBV vaccination.

The crude prevalence of diabetes among Indians is 7.5%.[28] This study found a higher prevalence of

diabetes (11%) among HCWs as compared with their community counterparts. Diabetes is likely to influence productivity, efficiency, quality and safety, not just because of absenteeism due to sickness, but also because it drains people of both physical and mental energy.[15] Shift work is a risk factor for developing diabetes. Potential explanations for this finding include the difficulty of maintaining a healthy lifestyle, e.g., a tendency to eat unhealthy foods and exercise less, as well as effects on the endocrine systems and circadian rhythm.[29]

Anemia is a major public health problem worldwide, particularly among females of reproductive age in developing country settings. The prevalence of anaemia among all women in India is 52%, of whom 15% are moderately anemic (Hb 70-99 g/l) and 2% are severely anemic (Hb < 70 g/l).[30] The consequences of anaemia for women include increased risk of low birth weight or prematurity, perinatal and neonatal mortality, inadequate iron stores for the newborn, increased risk of maternal morbidity and mortality, lowered physical activity, mental concentration, and productivity. Women with even mild anemia may experience fatigue and have reduced work capacity.[31] High prevalence of anemia among women in healthcare affects their productivity. Girls are more likely to be anaemic due to a number of reasons. In a family with limited resources, the female child is more likely to be neglected, for example. She is more likely to be deprived of good food and education, and may be expected to help with carrying out household chores. Menstrual blood loss, normal or abnormal, puts women at higher risk of anaemia.[32]

There was a higher incidence (71%) of anemia among the female HCWs in this study than amongst the population as a whole, but the study recorded a lower incidence of anemia (16.7%) among male HCWs as compared to the community (44.3%). Males who carry out heavy occupational work have previously been recorded to have a lower prevalence of anaemia[33], consistent with this study. This may be due to the fact that such individuals need a nutritionally rich diet to enable them to carry out their work activity.[33] They may have to take good care of their health to be able to meet the demands of their work life.

The incidence of various parasitic infestations and chronic illnesses (which can be causes of anaemia) were not included in this study, so it is difficult to comment on why the levels of anaemia within the study population varied from the community, and why there was a significant difference between males and females.

The mean alanine transaminase (SGPT) level in the average Indian population is between 19.35±3.3 IU/L to 21.87± 2.9 IU/L. This was found to be significantly elevated in our study (31.86 ± 17.37 IU/L). While there is lack of data on SGPT levels in HCWs, it is the most common and cost-effective screening test for asymptomatic liver disease and more investigation needs to be done on this issue.[34]

Despite the known risk to HCWs of occupational acquisition of HIV infection, our study did not find any participants to be HIV positive. A similar observation was made in a study conducted by in Iraq.[35] Another study conducted in South Africa in 2002 found that an estimated 15.7% (95% confidence interval (CI): 12.2–19.9%) of health workers employed in the public and private health facilities located in four South African provinces were living with HIV/AIDS. In that study, HIV prevalence was 20% (95% CI: 14.1–27.6%) in the 18–35 years age group, 20.3% in non-professionals and 13.7% in professionals[36] but it was not known whether the HCWs had acquired the infection in or outside the hospital but does mention that the observed value could be a reflection of the high prevalence of HIV in their community, and that this needed to be further evaluated.

The HCWs in our study most likely benefited from the strict infection control policies implemented in the hospital where the study was conducted. Repeated seminars and workshops conducted on occupational risks and their management could have played an important role in sensitizing them.

The reasons for poor health recorded in HCWs globally are varied, ranging from heavy exposure to pathogens at the workplace to poor infection control measures implemented at hospitals and laboratories, smoking, alcohol consumption, eating junk food, sleeping

erratically, and becoming obese while taking little physical exercise.[14] A study in Ethiopia[37] showed that most participants conceptualized wellbeing as an absence of stress rather than as a physically healthy state. The main stressors seemed to be inadequate medical supplies, fear of acquiring infection, concerns about performance evaluation, role ambiguity, stigmatizing attitudes towards mental health problems, structural and environmental factors, workload and lack of economic self-sufficiency, along with inevitable burnout if they continued to work in their current workplace without career progression. An unmet need for intervention for the mental health of healthcare workers is thus evident, though this was not evaluated in our study.

CONCLUSION

In conclusion, whilst globally HCWs are at significantly higher risk for developing some communicable diseases compared to the general population due to the nature of their work, this was not recorded in our study. Our study participants did, however, seem to be at higher-than-average risk of some common noncommunicable diseases, including diabetes and liver disease in both genders and anaemia in women. This indicates a need to prioritize annual health screenings so as to identify issues early and to issue appropriate treatment immediately. We must also encourage vaccination and continue to implement strict infection control policies where possible. Hospitals should also focus on stress management, healthy eating and self-care workshops to sustain the health and work capacity of HCWs. There is a scarcity of research on the occupational health of HCWs in India: we need to expand the scope of this research from single centre studies to multiple centres, to provoke interventions that are designed for large scale implementation. Where possible, infection control and vaccination of HCWs is paramount to prevent the spread of disease.

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