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Contents lists available at ScienceDirect

Diabetes & Metabolic Syndrome: Clinical Research & Reviews

journal homepage: www.elsevier.com/locate/dsx

Original Article

COVID-19 and mortality in doctors

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ARTICLE INFO

Article history:

Received 27 August 2020

Accepted 2 September 2020

Keywords:

COVID-19
 Coronavirus
 Pandemics
 Physicians
 Health personnel
 Health care
 Mortality
 Preparedness plans

ABSTRACT

Background and aims: COVID-19 disease appear to have been associated with significant mortality amongst doctors and health care workers globally. We explore the various risk factors associated with this occupational risk, especially focusing on India. This may elucidate lessons to protect these frontline workers during the COVID-19 pandemic.

Methods: We carried out a comprehensive review of the literature using suitable keywords such as 'COVID-19', 'pandemics', 'physicians' 'mortality' and 'health personnel' on the search engines of PubMed, SCOPUS, Google Scholar and ResearchGate in the month of July 2020 during the current COVID-19 pandemic and assessed mortality data.

Results: Mortality in health care professionals has been on the rise. The countries which faced the pandemic in the early months of 2020 have had a huge surge in mortality amongst doctors due to COVID-19. India continues to show a rising trend in COVID-19 cases, however although compared to the western world India has seen a comparatively favourable statistic. Male gender, elderly doctors and those belonging to Black, Asian, and Minority Ethnic (BAME) community seem to be predisposing factors in the western world.

Conclusion: COVID-19 has been associated with an increased mortality in doctors and health care workers. Until an effective cure/vaccine is developed, risk assessments at work, mitigating confounding factors, adequate supply of personal protective equipment (PPE) and enhanced protection against infection are necessary to protect health care professionals on the coronavirus frontline. Otherwise this occupational risk can lead to further untimely mortality and become another unintended consequence of the COVID-19 pandemic.

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1. Introduction

The novel Coronavirus SARS-CoV-2 outbreak has created a significant impact on the daily life and health care systems across the world including India [1–3]. COVID-19 has caused a huge burden and loss to the world with doctors bearing the brunt of physical

burnout, mental stress, occupational risk of infection with increased risk of morbidity and mortality, being the front-line workers. Currently India is the third worst affected country in the world with more than 2 million confirmed cases and above 43,000 deaths attributed to COVID-19 [4]. It has been observed that COVID-19 related mortality in the general population has been slightly lower in the South Asian subcontinent [5]. Concerns have been raised since nearly 200 doctors have succumbed to COVID-19 so far with a significant number of healthcare professionals affected as well [6]. The mortality of these doctors has made a dent in an already compromised health care system due to poor doctor patient ratio. The Indian Medical Association (IMA) National COVID-19 registry data suggests more than 1000 doctors have been infected with SARS-CoV-2 virus, where 75% of them are above the

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age of 50 years [7]. Doctors face multiple challenges while dealing with this pandemic-specially limited personal protective equipment (PPE), training, rest, and rotation but worst of all loss of life due to coronavirus infection [8,9]. IMA has issued a 'Red Alert' and requested the health authorities to ensure adequate safety of all doctors along with support from state sponsored medical and life insurance facilities to all involved in the coronavirus containment efforts [10]. We aim to explore the burden, the risk factors and lessons that can be learnt to protect these frontline workers.

2. Mortality statistics

As on date April 15, 2020; countries with the most reported physician deaths were from Italy 44%, Iran 15%, Philippines 8%, Indonesia 6%, China 6%, Spain 4%, USA 4%, and UK (11/278; 4%) [11]. Even though there is no global platform for assessing the mortality among doctors due to COVID-19, reported literature in the national media has raised concern (Table 1). Doctors account for 0.5% of the total deaths in India due to Covid-19. There have been 196 reported deaths among doctors in India due to COVID-19 as reported by IMA over the last 6 months until August 2020 after reporting of the first COVID-19 case on January 30, 2020 [12,13]. Developed nations in Europe, however, have had worse figures. Italy reported its 100th COVID-19 casualty amongst doctors back in April 2020 [14]. The reasons could be unpreparedness of these countries in terms of PPE, delayed implementation of social distancing and infection prevention strategies, and late lockdown in the early phase of the

pandemic.

2.1. Risk factors

We have identified several risk factors that are associated with increased mortality amongst the healthcare workers and doctors.

1 Age and Gender- Yoshida reported 120 deaths of medical doctors up to April 3, 2020 in the early months of COVID-19 [15]. Out of them 94 were between 50 and 99 years of age with a median age of 65 years and 108 were males. No reason for this disparity has been described in the article. The results of other meta-analysis showed that 60% of the COVID-19 patients were male [16]. The reason for a disproportionate mortality in the male gender is unclear. Lack of hand hygiene may be a causative factor for increased prevalence of COVID-19 infection in males. Social roles of females in Asian countries like India such as cooking, house cleaning etc may sensitize females to having a different perspective towards hand hygiene. Higher rates of tobacco consumption, increased concentration of Angiotensin-converting enzyme 2 (ACE-2) in males as compared to females, a reluctance to seek proper and timely medical care and even lower rates of handwashing absolutely has been quoted to be few of the reasons [17]. As observed about the deaths amongst the general population most of fatality were seen among elderly male doctors [15]. The reasons postulated are these senior physicians had re-started to work during the earlier

Table 1
Distribution of mortality in doctors due to COVID-19 in India.

Speciality Wise Distribution			
Speciality	Number of deaths	Speciality	Number of deaths
General Practitioner	80	Eye	02
Emergency medicine	09	Urology	02
Dentist	02	CTVS	01
TB and Chest	02	Neurosurgeon	01
General surgery	06	Obstetrics and Gynaecology	06
ENT	05	Paediatrician	06
Orthopaedics	03	Others	Rest
State Wise Distribution			
State	Number of deaths	State	Number of deaths
Madhya Pradesh	6	Andhra Pradesh	2
Maharashtra	23	Assam	2
Meghalaya	1	Bihar	19
Odisha	1	Chandigarh	2
Pondicherry	1	Delhi	12
Tamil Nadu	43	Gujarat	23
Telangana	5	Haryana	3
Uttar Pradesh	11	Jammu & Kashmir	1
West Bengal	16	Karnataka	15
Age Wise Distribution (Median -60 Years)			
Age range (Years)	Number of deaths	Age range (Years)	Number of deaths
20–40	18	>60	81
41–60	95	Data Not available	2
Gender Wise Distribution			
Gender	Number of deaths	Gender	Number of deaths
Male	190	Female	6

Abbreviations: CTVS= Cardiovascular and Thoracis Surgery; TB = Tuberculosis; ENT: Ear, Nose and Throat.

Source: Modified completely from data of Indian medical association, New Delhi.

part of the pandemic when protection may have been insufficient, or they had associated co-morbidities.

- 2 **Medical Speciality** –Physicians from almost all the fields have succumbed to COVID-19 [11]. Frontline doctors that deal with COVID-19 patients seem to bear the brunt of mortality rates. Deaths were noted to be more common among general practitioners or physicians, suggesting a higher risk of deaths among doctors who may have repeated encounters with COVID-19 patients [15]. Physicians from certain fields of medicine such as anaesthesiology, dentistry and otorhinolaryngology are more prone to acquire COVID-19 as their work involves intubation, oral/nasal or other aerosol generating procedures, which may place them at an increased risk and Table 1 seems to suggest that.
- 3 **Lack of training to deal with COVID-19**- The novel SARS-CoV-2 is predominantly a respiratory illness spread by droplet transmission. The COVID-19 pandemic spread to the European countries at a time when most of the countries were unprepared. At the outset there was lack of training with no established standardized guidelines for PPE and disinfection to deal with the new viral pandemic. The spurt of cases and delay in lockdown to halt the spread of viral transmission also left the medical community overburdened with constrained resources [18]. Doctors and health care workers on the coronavirus frontline thus exposed and this may explain some of the casualties in the early phase of the COVID-19 pandemic [19]. Subsequently Centers for Disease Control and Prevention (CDC) and other National Public health agencies guidelines have strengthened necessary infection prevention and control strategies including standards for personal protective equipment (PPE) to protect both patients and health care workers [20,21].
- 4 Before COVID-19, measures such as the use of PPE, physical distancing measures, continuous use of masks by Health Care Professionals (HCPs) in hospitals were not universally followed by medical professionals. This was true even during the H1N1 pandemic, where such wide scale preventive measures were not utilized ubiquitously. During the early period of the COVID-19 pandemic, doctors and other HCPs were not aware of the need for stringent practice of these preventive measures, which later proved to be highly effective against disease transmission. In their commentary, Xiang and colleagues describe how many doctors in China, unaware of the virus or the precautionary measures against acquiring the virus, got infected while attending their patients. Once the highly infectious nature of the virus was established, suitable precautionary measures were put into place by the Chinese authorities. The rest of the world took cue from the experience in China and pre-emptively guided their medical professionals towards learning preventive measures. However, issues such as insufficient time to train every HCP, interpersonal variations in learning new techniques and the unparalleled and novel nature of the disease burden may have led to inadequate awareness and precautionary measures at least during the early parts of the outbreak [22].
- 5 **Lack of adequate PPE in the early phase of the pandemic**-The most effective preventive strategy against COVID-19 is a stringent and effective use of personal protective equipment (PPE). In early April, when the outbreak was exponentially increasing in magnitude in Europe, concerns regarding a lack of PPE were voiced by health care professionals across multiple countries in the continent [23,24]. Soon, the lack of numbers of PPE was managed by development of effective reuse methods and an increase in the production capacity of PPE.
- 6 **Role of Race and Ethnicity and mortality in doctors:** Race and Ethnicity has been shown to have a significant bearing on the course of COVID-19 disease. It has been acknowledged that

there is disproportionate mortality and morbidity amongst black, Asian and minority ethnic (BAME) people, including our National Health Service (NHS) staff, who have contracted COVID-19 [25,26]. A large proportion of BAME healthcare workers were more severely affected by COVID-19 at the beginning of the pandemic succumbed to the disease. 94% of doctors who lost their lives were of a BAME background [27]. A multitude of confounding reasons including individual patient factors, genetic susceptibility, socio-economic factors, associated comorbidities have been postulated to suggest higher disease burden in BAME people including doctors with calls for urgent public health research priority in this discrepancy [28].

- 7 **Other factors**- Certain factors which are attributed to death in frontline clinicians include lack of adequate PPE, inadequate technique of donning and doffing, non-disclosure by patients of their exposure to possible COVID-19 excessive working hours and poor doctor-patient ratio. Certain comorbidities including advancing age, diabetes mellitus, cardiovascular diseases, chronic lung disease or immunocompromised states are also contributory [29].

3. COVID-19 risk and strategies to protect health care professionals in India

- India is a country with a large population where most of the patients seek treatment in government hospitals. The outpatients of these hospitals have been flooded with patients even during the lockdown period. It has been difficult to organise testing for COVID-19 of all patients visiting these hospitals. This could be another cause of exposure to the doctors from these patients. Most of the elderly doctors having co-morbidities continued to do private practice without taking proper precautions succumb to death in various states across India. In Bihar, the percentage of doctors' death is 4.75%, which is nine times more than the national average. One of the reasons for more doctors' death in the Bihar state was doctor's work for more than longer days than the other states as the quarantine protocol of 15 days was not followed in managing covid 19 patient and due to large number of vacant post of doctors; the elderly and comorbid doctors were forced to perform duty and got no relief [30].
- As such lack of COVID-19 safe facilities, resources, availability of appropriate PPE and lack of uniform application of infection prevention strategies remain cause of concerns and an occupational risk for health care professionals in India.
- However, cues have been taken with a stringent lockdown, creation of dedicated COVID facilities, indigenous production of PPE and sanitisers, enforced central health guidelines and protocols. Training of the health care workers on use of PPE and prevention of spread of infection has been carried out [31].
- By the time India saw a substantial growth in COVID-19 patients, the production and import of PPE had already been ramped up in the country. However, even with this increased capacity, a shortage of PPE was expected in the country considering the population. The country's premier medical institute (All India Institute of Medical Science (AIIMS) Delhi, issued timely guidelines on the reuse of PPE [32]. These measures may have contributed significantly towards reducing the effect of PPE shortfall.
- Current data from the IMA (Table 1) suggests general practitioners, primary care physicians and emergency doctors dealing acute or active COVID-19 cases seem to be disproportionately affected. The IMA National registry is a good step forward and initiatives such by NHS England to launch an enquiry into excess BAME NHS deaths will help the world community to understand

the mitigating factors leading to HCP deaths and take steps to protect them [33].

- All the health care workers and doctors should screen for Tuberculosis and a major comorbidity such as diabetes before start practicing or doing Covid-19 duties. As history of latent or active tuberculosis is an important risk factor for acquiring COVID-19 infection [34,35].

4. Limitation of the study

COVID-19 is an evolving disease. There is lack of uniform database on morbidity and mortality statistics due to COVID-19 amongst doctors and health care workers globally. This limits the extent of search and exploring any other confounding reasons behind mortality amongst health care professionals.

5. Conclusion

The significant mortality amongst doctors and other health care workers involved in the coronavirus frontline has been concerning. There are various regional differences among countries and various risk-factors which lead to variable burden. Concerted efforts to understand the factors highlighted in the article, mitigating confounding factors, risk assessments and adequate protection of health care professionals is the need of the hour to support them in this public health crisis. This should not become one more unintended consequence of the COVID-19 pandemic.

Source of funding

None.

Declaration of competing interest

None to be disclosed by all authors.

Acknowledgement

Authors are thankful to Indian Medical Association for providing the list regarding mortality of doctor in India.

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