



The Effect of COVID-19 on the Mental Health of Healthcare Workers: A Systematic Review

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: As COVID-19 pandemic continues to affect every nation, Healthcare Workers (HCW) who care for the patients are psychologically impacted. This study aims to assess the psychological impact experienced by HCW and the psychosocial support they received.

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Methods: Using PubMed, google scholar and Embase from December 2019 through June 2021, we found 376 studies on the impact of the COVID-19 pandemic on the mental health of HCW. Using our inclusion criteria, 325 studies were excluded. 51 full-text articles were assessed for eligibility. 9 articles which met our criteria and eligibility criteria reported on 19,232 HCW, and 75.2% of the study participants were women.

Results: The study participants reported high levels of stress, hypervigilance, fatigue, sleep problems, PTSD symptoms, poor concentration, depression, anxiety, burnout, emotional exhaustion, depersonalization, suicide and self-harm ideations and somatic symptoms due to the COVID-19 pandemic. The psychosocial support provided to HCW includes counseling and psychotherapy-based sessions on stress adaptation, onsite mindfulness-based crisis intervention, online form of emotional freedom technique, and Effort-reward system.

Conclusion: Multiple interventions found in our review were effective in mitigating psychological stress among HCWs. These interventions should be considered as part of support provided to HCW with psychosocial challenges.

Keywords: COVID-19; coronavirus; mental health; healthcare workers; depression; anxiety.

1. INTRODUCTION

In December 2019, China announced that it was battling acute respiratory infection thought to have originated from Wuhan. At the time, very little was known about this new disease called Coronavirus (COVID 19) and its mode of transmission. As the virus continued to spread from China to different parts of the world, the World Health Organization (WHO) on January 30, 2020, declared the 2019 New Coronavirus, a Public Health Emergency of International Concern, and on February 11, 2020, WHO called it a global pandemic and officially named the new coronavirus - COVID-19 [1,2]. As of June 2021, the WHO has reported more than 180million people infected with the coronavirus, with more than 3million deaths recorded [3].

Nonetheless, more people continue to be infected, and the lack of definite treatment has overwhelmed the health care systems, particularly health care workers. HCWs have assumed critical responsibilities in the control, prevention, care, and treatment of infected patients during the pandemic. They provide necessary health interventions for suspected or clinically diagnosed COVID-19 patients and work on the frontlines, often for long hours under harsh and stressful conditions [4]. The pandemic has led to increased high-quality healthcare demands, increased patient mortality, emotional and physical stress, and rationing of healthcare supplies. Furthermore, the social distancing required to prevent the spread of the virus has caused social and psychological distress [5]. HCW who are working in COVID-19 wards have minimal opportunity to communicate and interact with their colleagues, which may exacerbate their anxiety and stress [4].

For many HCW, the period of psychological distress attributed to social isolation in the face of limited medical resources, heavy workload, lack of specific treatments, risk of infection, and the separation from family and friends for a long time, has created a considerable burden that eventually led to some mental health challenges such as stress, anxiety, depressive symptoms, insomnia, anger, and fear [4,6].

Similarly, the unexpected nature of the pandemic and the high infectivity of the virus has inevitably compounded the cause of stress, anxiety, and depression in healthcare workers. Anxiety can be described as a state of fear and tension in response to a threat [7]. In addition, the fear of contracting the disease and bringing it home to their family members, especially aged parents, and those with underlying health conditions, also makes them susceptible to stress and anxiety. These fears and anxiety indicate the necessity of providing psychological support for healthcare workers, such as implementing occupational health surveillance programs that train and educate healthcare workers regarding their ability to address infectious disease and associated psychological distress [5].

COVID-19 is an infectious disease that has affected every nation in the world, creating a worldwide pandemic. Infectious disease outbreaks have a negative psychological impact on the general population, and especially on health workers [4]. However, current research mainly focuses on the general population's wellbeing with little attention being directed toward healthcare workers' psychological distress. Therefore, the present study aims to assess the mental health symptoms experienced

by healthcare providers and the psychosocial support they received while working in the frontline of the pandemic and the effectiveness of the support they received.

2. METHODS

2.1. Search Strategy

The systematic review is registered with PROSPERO (registration ID: CRD42021253124). This study is reported per the protocol reported in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement. We searched PubMed (MEDLINE), Embase and Google Scholar for articles published between December 2020 and June 2021. String of search terms on the Medline database are ((coronavirus [MeSH Terms]) OR (covid19[MeSH Terms])) OR (sars virus [MeSH Terms])) AND (association, mental health [MeSH Terms])) OR (PTSD [MeSH Terms])) OR (anxiety [MeSH Terms])) OR (acute stress disorder [MeSH Terms])) OR (depression [MeSH Terms])) AND (healthcare providers [MeSH Terms]). The search terms used for Embase, and Google scholar are, coronavirus, COVID19, SARS virus, anxiety, acute stress disorder, depression and healthcare providers. All authors initially screened the abstracts of all articles using an abstract screening software, (abstrackr) and we also searched reference lists of included articles for information relevant to our study. Studies reporting the effect of the COVID-19 pandemic on HCW mental health were included.

2.2 Study Selection

Studies were selected according to the following criteria: population, exposure, comparison, condition or outcome(s) of interest, study design, and context.

- Population: Healthcare workers.
- Exposure: Healthcare providers actively working at any healthcare institution during the COVID-19 pandemic.
- Condition or outcome(s) of interest: The primary outcome was the psychological effect of COVID-19 on HCW. The secondary outcome was to find out if these psychological stressors/effects influenced the delivery of healthcare.

- Study design and context: Eligible studies were randomized controlled trials, cohort (prospective or retrospective), case series, and case-control studies.

Inclusion Criteria: studies examined and reported the psychological effects of the COVID-19 pandemic on healthcare workers, studies involved, articles published between December 1, 2019, through June 23, 2021, the impact of the COVID-19 pandemic on the delivery of care by health care personnel, availability of mental health support, and management.

Exclusion Criteria: literature and systematic review studies, editorials, and commentaries articles irrelevant to the exposure (COVID-19), and the psychological outcomes, articles not focused on healthcare professionals.

2.3 Data Collection & Study Assessment

All authors (OA, HO, OF, AU, DO, CU, IO, GA, MO, BY, MO, AO) independently reviewed the abstracts of all the articles identified. They identified articles to be "Adopted" and "Not Adopted" based on the inclusion criteria. Afterwards, they screened the adopted articles and created a spreadsheet to include proposed articles to be used for our research work. This was carefully done with the inclusion and exclusion criteria. All authors were involved in the final selection process. After the final selection process, a flow chart table was generated following the PRISMA guidelines. Resources for this review were obtained via qualitative and quantitative analysis.

2.4 Data Synthesis & Analysis

Quantitative and qualitative studies based on original research examining the impact of the COVID-19 pandemic on the mental health of health care workers were included. The data synthesis was done in a clear and detailed descriptive summary of the included studies via tabulating. The quantitative data were extracted using Microsoft Word. All the identified concepts and themes were arranged and grouped to synthesize significant themes. All authors were responsible for reviewing and discussing major identified themes in the study. Publication bias was tested by visually inspecting for symmetrical distribution.

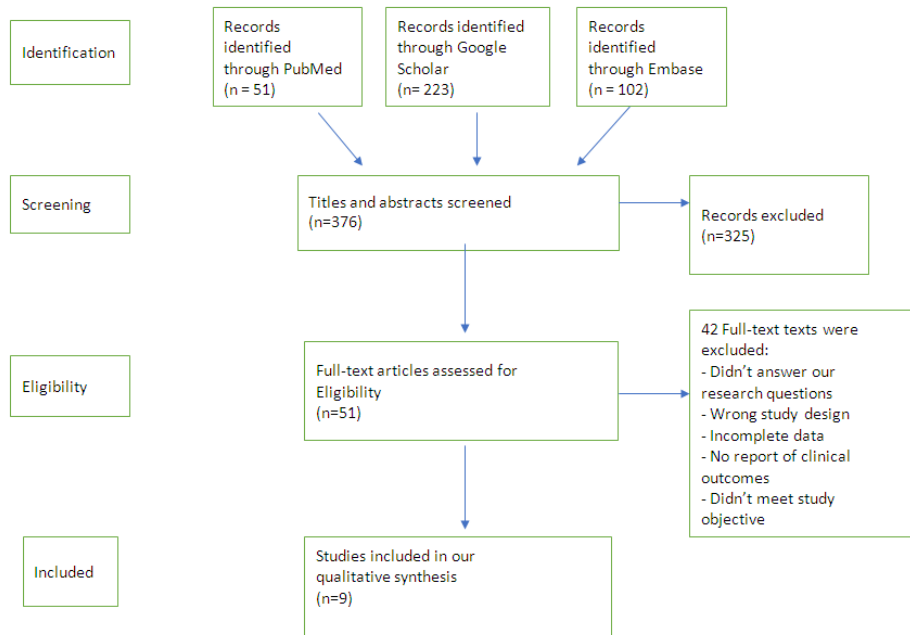


Fig. 1. PRISMA Flowchart

3. RESULTS

Our study included 19,232 healthcare workers from different countries, and 75.2% of the study participants were women. Among the HCW in the study, 6478 were nurses, 4174 doctors, 4850 public health workers, 2149 paramedics, and other HCW's make up the other study participants. The HCW's included in the studies reported experiencing high levels of stress, hypervigilance, fatigue, sleep problems, PTSD symptoms, poor concentration, depression, anxiety, burnout, emotional exhaustion, depersonalization, suicide, and self-harm ideations and somatic symptoms due to the COVID-19 pandemic. The most prevailing conditions found in the studies were depression, anxiety, and stress. Some participants reported that they coped with social support from family, friends, and colleagues during the pandemic, while others reported that self-resilience and rumination helped them cope. Some of the articles we analyzed reported specific measures employed to assist HCW in managing the impact Covid-19 pandemic on their mental health, including- counseling and psychotherapy-based sessions on stress adaptation, onsite mindfulness-based crisis intervention, online forms of emotional freedom technique, and emergency reward system.

3.1 Interventions Implemented to Support Healthcare Workers during the Pandemic

We analyzed the effects of psychosocial interventions implemented to support HCW during the pandemic. Rodriguez et al. conducted a study on 150 patients. They reported that participants who received onsite mindfulness-based crisis intervention sessions perceived the intervention as helping reduce their stress level [9]. However, there was no significant statistical difference ($t = -0.599, \alpha > 0.05$) on the intervention effect between participants who attended just one session and those who attended more than one session [9]. Berner Dinceret al. conducted a study on 80 participants. They reported that participants who received an online form of Emotional Freedom Techniques (EFT) had a highly significant ($p < .001$) reduction in stress, anxiety, and burnout compared to the control group [10]. Zhang et al.'s study on 4850 HCW also found that the effort-reward imbalance model helped HCW deal with depression and anxiety during the pandemic [14]. The study reported that the more the participants were rewarded, the lower their reported depression and anxiety. In addition, a study by Kris Vanhaecht et al. suggested the need for professional guidance by a psychologist, more support from healthcare leadership, and

implementation of the RISE (Resilience in Stressful Events) model, which was developed in John Hopkins Hospital in 2010 to provide support to HCW [8].

4. DISCUSSION

Busch et al., in their study, described an intense effect that epidemics and pandemics have on the mental health of HCW and how this has been consistent over the years [17]. One of the objectives of this systematic review is to examine if HCW experience mental issues like depression and anxiety during the COVID-19 pandemic. We observed that depression, anxiety, and stress were the most prevalent mental health issues reported by HCW. Deng et al. established that anxiety and depression were seen more in HCW, with the prevalence of 40% and 31%, respectively, instead of the general population with anxiety and depression at 22% and 26%, respectively [18]. Similarly, Sanghera et al. reported a higher prevalence of depression (13.5%-44.7%) and anxiety (12.3%- 35.6%) in HCW compared to the general population [19]. Although lack of social support, pre-existing psychiatric and medical conditions were suggested to predispose to anxiety and depression in health care workers during the COVID pandemic, Sanghera et al. substantiated that having direct contact with COVID-19 patients was the most frequently seen predisposing factor [19].

While the COVID-19 pandemic has been associated with mental disorders like anxiety and depression among health care workers, [8,14,15] information on the effect of these disorders on quality of care is still limited. However, Vanhaecht et al. reported that increased anxiety was related to exasperated work pressure and heightened work stress, which led to adverse mental health [8]. They further highlighted a probable cause of poor quality of care due to negative mental health. In general, pandemics and public health crises have been shown to play a significant role in the quality of patient care. Xiaoming et al. revealed an association between public health outbreak concerns and behavioral changes in healthcare workers primarily attributed to work stress and minimal support [15]. Unfortunately, this negatively impacts the delivery of care as the healthcare system is burdened during such a crisis [15].

Furthermore, Lai et al. and Liu et al. reported that depression and anxiety experienced among healthcare workers during the pandemic caused

psychological distress, which indirectly affects the delivery of care [20,21]. Another study conducted by Lai et al. during the SARS outbreak described that the probability of nurses developing mental disorders is very high [20]. This translated to a psychological and physical barrier in the delivery of nursing care.

The anxiety caused by the overburdened system during the pandemic made healthcare providers more susceptible to emotional, physical, and mental exhaustion which has an inverse relationship with quality health care, self, and work-efficacy.¹³ Even more problematic is the potential of these mental disorders persisting post-pandemic in affected healthcare providers [13].

The ongoing COVID-19 pandemic revealed loopholes and deficiencies in the healthcare industry. Multiple studies reported an aggravated negative experience reported by healthcare professionals, which caused mental disorders like anxiety and depression [22,23,24]. Unfortunately, no specific support system was put in place by most healthcare facilities or hospitals [8]. Some hospitals with care systems for healthcare professionals suspended operation during the pandemic, placing more strain on mental health support [8]. It should be noted that multiple studies reiterate the importance of protecting healthcare providers' sanity and mental health as this can greatly impact the delivery of care. The impact could be positive or negative depending on the state of mental health [22,23].

However, some hospitals in China provided mental health support for their workers via telephone hotlines, group therapy, one on one therapy, and psychotherapy [24,25]. Sadly, very few healthcare providers utilized these services, most likely due to heavy workload, fear of stigmatization, or limited break periods [24]. A study by Chen et al. reported a rapid response to prevent and mitigate mental stress in healthcare providers working at the Second Xiangya Hospital, China [24]. A team was put together to help the staff of the hospital navigate emotional and mental stress. This intervention was enacted in three ways: a team of psychologists to help providers effectively manage mental stress or problems, direct access to psychologists via a telephone hotline, and provision of therapeutic group sessions to help dissolve stress [24]. Unfortunately, again, the hospital staff were not as receptive to these interventions.

Table 1. Study sample characteristics, Effect of pandemic, coping strategies and Mental health assistance provided

Studies included	Location	Type of Study	Study Participant characteristics	Effect of pandemic	Coping strategies	Mental health assistance provided	Summary of findings
Kris Vanhaecht et al 2021 [8]	Belgium	Original research article	Females- 3858 Males-645 Unknown- 6 Paramedics-1831 Nurses-1508 Doctors- 603 Management- 552 Others-15	Stress, hypervigilance, fatigue, difficulty sleeping, Anxiety, flashback, difficulty concentrating, and sad mood.	Support from family and friends	Suggested RISE (Resilience in Stressful Events) model	The impact of COVID-19 was most significant among participants 30–49 years, females, and nurses. A considerable proportion reported the need for professional guidance by psychologists and more support from their leadership
Rodriguez-Vega B. et al., 2020 [9]	Spain	Exploratory report	Females- 119 Males-30 Unknown -1 Nurses-52 Nursing assistant-33, Orderly-11, Nursing resident-1, Medical resident-2. Physician- 8, Cleaning staff-2, Technician-2, Others-37.	Fatigue, dysregulation of sleep patterns, anxiety, depressive symptoms, and psychological distress.		Onsite mindfulness-based crisis intervention	Ninety-two HCWs (61%) participated in more than one session. Most study participants reported the sessions were helpful. Only three people (2%) reported a minor adverse effect (increased anxiety or dizziness).
Berna Dincer et al 2020 [10]	Turkey	Randomized controlled trial	Mean age of 38.6 years. Nurses caring for COVID-19 patients. 64 females and eight males	stress, anxiety, and burnout		Online form of Emotional Freedom Techniques (EFT); Intervention group (n = 35) and a no-treatment control group (n = 37).	A single online group EFT session reduced stress, anxiety, and burnout levels in nurses treating COVID-19.
Han Xiao et al 2020 [11]	China	Observational study	Mean age of 33.45±9.63 years Participants were 51 males and 129 females. Of which 82 were doctors and 98 were nurses	Anxiety, stress, low self-efficacy, low sleep quality	Social support		Levels of social support for medical staff were significantly associated with self-efficacy and sleep quality and negatively related to the degree of anxiety and stress.
Di Filippo P. et al 2021 [12]	Italy	Cross-sectional study	Fifty-eight pediatricians, 55 pediatric residents, and 15 pediatric nurses, and 47 family pediatricians.	Sleep disturbance (67.4%) and anxiety (19.4%)			Lower values of anxiety and social support were found in primary care staff compared to secondary care one.

Asghar M.S. et al 2021 [13]	Pakistan	Cross-sectional study	<p>Forty-one were males, and 134 were females. Mean age 37.0 years All participants were physicians; 47 were females while 40 were males.</p> <p>18 were consultants, 43 were residents, and 26 were interns</p> <p>Mean age of 30.87 ± 7.34 years</p>	Emotional exhaustion (54%), low personal accomplishment (31%) and depersonalization (77%)	Counseling and psychotherapy-based sessions	Emotional exhaustion was observed to be much greater in residents (P = 0.002), in those who worked in COVID-19 units (P < 0.001), in those infected with COVID-19 (P < 0.001), and in those who were unmarried (P = 0.026). Depersonalization was reported more in residents (P < 0.001), in those who worked in COVID-19 units (P < 0.001), and in those infected with COVID-19 (P < 0.001) regardless of gender (P = 0.691) or relationship status (P = 0.798).
Zhang J. et al 2021 [14]	China	Informed study	Public health workers: 62.89% (3050) were females while 37.11 (1800) were males. In addition, 62.1% were junior, 20.1% were intermediate, and 8% were senior workers.	Anxiety and depression	The emergency reward system, comprising reasonable work-allocation mechanism, bonuses and honorary titles, a continuous education system, and better career development opportunities	The data showed that effort and over-commitment were positively linked with depression and anxiety, while reward was negatively linked with depression and anxiety.
ErenUsul et al 2020 [7]	Turkey	Survey article	EMS professionals: 47.3% (n=190) were females and 52.7% (n=212) were males. 51.7% (n=208) of the participants were emergency medical technicians (EMTs), 27.4% (n=110) were paramedics, 12.4% (n=50) were drivers, 5% (n=20) were physicians, and 3.5% (n=14) were nurses.	Anxiety		Nurses had a significantly lower anxiety level compared to other participants (p<0.05). However, anxiety among participants who were concerned about infecting their family members was substantially higher.
XuXiaoming	China	Cross-	Health workers	Depression 30.2%,		This was an online survey of 8817

et al 2020 [15]	sectional study	Doctors- 3212, Nurses- 4685, other HCWs- 920 Female- 6874 Male- 1943 Mean age of 33.25 ± 8.257	anxiety 20.7%, suicide, and safe harm ideations 6.5% and somatic symptoms 46.2%	hospital employees. Depression, anxiety, somatic symptoms, and SSI (suicide and self-harm ideation) were prevalent in 30.2 percent, 20.7 percent, 46.2 percent, and 6.5 percent of this population, respectively.
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Table 2. Suggested mental health interventions

S/N	Interventions	Number of participants	Result
1	On-site mindfulness-based crisis intervention [9]	150	Participants perceived the intervention as helping reduce stress. There was no significant statistical difference ($t = -0.599, \alpha > 0.05$) in the perceived helpfulness between those participants who attended just one session and those who attended more than one session
2	The online form of Emotional Freedom Techniques (EFT) [10]	80	Highly significant ($p < .001$) reduction in stress, anxiety, and burnout among the EFT group compared to the no EFT group.
3	Effort-reward imbalance model(emergency reward system) [14].	4850	Reward (OR: 0.91; 95% CI: 0.89, 0.92) had a negative association with depression Reward (OR: 0.91; 95% CI: 0.91, 0.94) had a negative association with anxiety
4	RISE (Resilience in Stressful Events) model [8]	None (suggested)	The RISE model was initially implemented in John Hopkins Hospital in 2010 to support HCWs who experience emotional distress following patient adverse events. It has so far been demonstrated to be beneficial to frontline workers in improving mental health and productivity [16].

Despite limited mental health assistance during this pandemic, multiple studies have recommended specific interventions that can help reduce mood disorders and other forms of mental stress. Dewey et al. suggested creating a very nurturing and safe work environment, reiterating hospital administrators' support, promoting, and showcasing unity to encourage staff [26]. These factors provide solace and comfort, creating a healthy work environment. Weiner et al. recommended the implementation of internet-based or online cognitive behavioral therapy to help mitigate stress in healthcare providers [27]. Their study showed a significant decrease in stress levels and served as prevention of psychological distress [25]. Chen et al. reported practical interventions implemented during the pandemic, such as providing access to clinical psychologists, sufficient personal protective equipment (PPE), a safe and relaxing space for hospital staff to rest and possibly quarantine [24].

Important findings from our study found the RISE (resilience in stressful event) model proposed by Kris Vanhaecht et al., a very useful tool in reducing adverse effects of emotional stress experienced by health workers [8]. This model utilized provision of psychological support as a major tool. The outcome was improvement in mental health and overall productivity of health workers. Rodriguez et al. implemented the on-

site mindfulness-based crisis intervention on front line health workers in their study and reported a significant reduction in stress for participants [9]. Another study by Dincer et al. proposed using Emotional Freedom Techniques (EFT), which showed a significant reduction in mood disorders [10]. A distinct recommendation by Zhang et al. is the use of reward systems; they reported a risk reduction in the incidence of mental disorders [14].

5. LIMITATIONS

We excluded any articles not published in English and identify that we may have missed articles that explored this topic in other languages. However, we were able to obtain nine individual studies with a cumulative sample size of 19,352 which is a sizable number of HCW. Similarly, the included papers utilized different sampling designs, which could cause some potential biases. Moreover, the studies used different scales to assess depression and anxiety experienced by HCW during the COVID-19 pandemic, which could cause inconsistencies in the prevalence of anxiety and depression reported by the studies utilized. Regardless of these limitations, our study was able to substantiate further the effects of COVID-19 on the mental health of HCW.

6. RECOMMENDATIONS

Most of our studies in this systematic review reiterated the importance of protecting the mental health of healthcare providers as this can significantly impact the delivery of healthcare. Based on our findings, specific measures were identified to solving mental health problems among HCW during and after the COVID-19 pandemic.

- Developing structured therapeutic options for HCW, including but not limited to counseling and physiotherapy-based sessions, mindfulness-based interventions, online form of emotional freedom technique, and emergency reward system.
- Creating a nurturing and safe work environment for HCW is reinforced by the support of hospital administrators. This will promote unity to encourage staff to continue to contribute their quota to ending the pandemic.
- Health institutions should create intentional measures that provide a physically safe and relaxing space for hospital staff to rest and self-isolate from family after learning about their diagnosis. Thus, providing support for them through the period of their illnesses.
- Focusing financial resources to the most hit communities where wealth equity can spread to those in need of remunerations, including providing PPEs, drugs, and vaccines, thereby reducing the incidence of this disease in these communities.

Global efforts in making the mental health of HCW a top priority as much as the attention is given to the general population to end this pandemic

7. CONCLUSION

Our findings suggest that healthcare workers are at risk of developing mental stressors like anxiety and depression due to enormous workload and minimal rest during the COVID-19 pandemic. While most providers attributed their mental stress to fear of infecting family and loved ones, others highlighted the negative impact of a poor work environment and policies. Our findings also suggest that limited resources were made available to support healthcare providers during this trying period. Implementation of the following strategies might help mitigate mental stress, such as a safe and supportive work environment,

online/internet-based cognitive behavioral therapy, judgment-free zone group therapy sessions, accessible psychotherapy, and emotional freedom techniques.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard, written ethical approval has been collected and preserved by the authors.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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