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Original Research Article

A clinico-epidemiological study of mask induced facial dermatoses due to increased mask usage in general public during COVID-19 pandemic

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ABSTRACT

Background: Since the beginning of COVID-19 pandemic many people started experiencing facial dermatoses like acne due to prolonged mask use and other personal protective equipment's. Though most of the facial dermatoses due to face mask are reported in healthcare workers, general public are also affected by facial dermatoses due to prolonged mask use. Hence, we decided to undergo a study on different patterns of facial dermatoses due to prolonged mask use in Rajiv Gandhi government general hospital, Chennai. Aim of the study was to find out the incidence of facial dermatoses due to prolonged mask use in general public in the OPD of department of DVL in MMC and RGGGH, Chennai.
Methods: This is a cross sectional study conducted at RGGGH during the months august, September and October 2020. The clinico-epidemiological details were collected from 400 patients attending the OPD of department of DVL at MMC and RGGGH.
Results: Among 400 study participants with mask induced facial dermatoses, acne (Maskne) was the most common facial dermatoses detected in 43% of participants, followed by Seborrhoea (28%), frictional dermatitis (18%), contact dermatitis (16%), non-specific erythema, cheilitis and other conditions.
Conclusions: Mask induced facial dermatoses can occur due to various factors like occlusive effect of mask, hyperhydration, seborrhoea, ambient high humidity due to sweating. As mask usage cannot be abandoned completely due to risk of virus transmission, dermatologists must be aware of the preventive strategies and treatments for mask induced facial dermatoses.

Keywords: Facial dermatoses, Maskne, COVID-19, Seborrhoea

INTRODUCTION

During this COVID-19 pandemic, India was one of several countries affected by SARS-CoV-2 (COVID-19). In 1897, Jan Antoni Mikulicz-Radecki, a Polish surgeon who practiced in Cracow, Krolewiec and Wroclaw, was the first to introduce cotton face masks for use during surgery.[1] Face masks are believed to effectively control the spread of respiratory viral transmission and may effectively control Influenza.[2]

The widespread use of face mask by the general public during the SARS pandemic and H1N1 Influenza spread is well known and recently in 2020 for COVID-19 pandemic. The different types of skin manifestations of personal protective equipment and face mask induced acne is well documented in previous studies. Because of the abrupt change in the behaviour of general public, different facial dermatoses caused by face masks other than acne is still expanding and is in the initial stage of its studies. The aim of this study is to determine the incidence of different types of facial dermatoses induced by face mask in general public during this COVID-19 pandemic.

METHODS

This was an Observational study carried out from August 1, 2020 to October 31 2020 in the department of DVL, MMC, Chennai. All new patients with mask induced facial dermatoses and old patients with exacerbations of skin lesions over face due to mask usage attending the OPD during this period were included in the study. history and clinical examination were performed for each patient and diagnosis were made on clinical examination. The study was divided into four parts: Selection of the study population, history taking and data collection, clinical examination and data analysis. Different types of facial dermatoses like acne, seborrhoea, contact dermatitis were noted and compared with data from different countries and different regions within the same country. Statistical analysis was conducted with SPSS Statistics 24.0 (IBM corporation, Armonk, NY)

Study design and participants

This study comprises a cross-sectional design. The study was conducted from August 1 2020 to October 31 2020. The patients with mask induced facial dermatoses attending OPD of department of DVL at MMC and RGGGH were included in the study. The number of participants who participated in our study is 400.

Procedure

The outpatients attending department of DVL with mask induced facial dermatoses during the month of august, September and October were included in the study and examined for different patterns of facial dermatoses due to prolonged mask usage. Informed consent was obtained from all the participants.

Clinical factors

Detailed clinical history including basic demographic details and occupational details were taken. History of average duration of mask usage per day (In hours); type of mask (most commonly used); history of new onset acne lesions or aggravated acne during this COVID pandemic due to mask usage; symptoms associated with acne; history of symptoms relating to other conditions like rosacea, contact dermatitis; history of acne mechanica; history of usage of cosmetic products; history of other issues related to mask were part of the questionnaire. Since this is the first literature on mask induced facial dermatoses in South India, there are no references for questions related to mask induced specific facial dermatoses in this questionnaire though most of the questions are related to acne as it is the most commonly reported dermatoses due to prolonged mask usage and other questions related to contact dermatitis, seborrhoea etc.

Statistical analysis

The data collected were documented in google sheets. Statistical analysis was performed using commercial software (SPSS; version 17.0). $P<0.05$ was considered significant.

RESULTS

Participants

A total of 400 participants were included in the study, of which 116 (29%) were males and 284 (71%) were females. The age group of the participants involved in the study ranges from 11 to 74 years of age and the mean age is 24. Nearly 232 (58%) of the study participants were wearing mask for <6 hours per day on average with the most common mask used being cloth mask (46%) by 184 participants. The most common facial dermatoses reported was acne (43%) in 172 patients followed by seborrhoea in 64 (28%) patients, frictional dermatitis in 41 (18%) patients, Contact dermatitis in 36 (16%) patients, non-specific pruritus in 31 (14%) patients, Nonspecific erythema in 30 (13%) patients, Exacerbation of previous conditions in 11 (5%) patients like seborrheic dermatitis (4 patients), Molluscum contagiosum (1 patient) and 6 patients became more prone for allergy compared to pre-COVID-19 period, cheilitis in 9 (4%) patients and hypopigmentation over the area covered by mask in 5 (2%) patients.

Age distribution

Among the 400 study participants, most of the participants belonged to the age group 20 to 25 years of age (178 patients) with the youngest patient at 11 years of age and the eldest patient at 74 years of age in our study. (Figure 1).

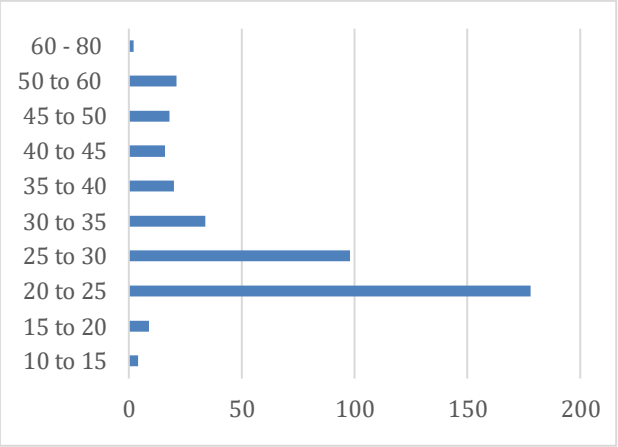

Figure 1: Chart of age distribution of mask induced facial dermatoses.

Gender distribution

Among the 400 study participants, most of the participants were females (79%) which shows that females are mostly affected by mask induced facial dermatoses. The possible explanation can be more frequent usage of cosmetics by females compared to males which might lead to an occlusive effect inside the mask predisposing to mask induced dermatoses (Figure 2).

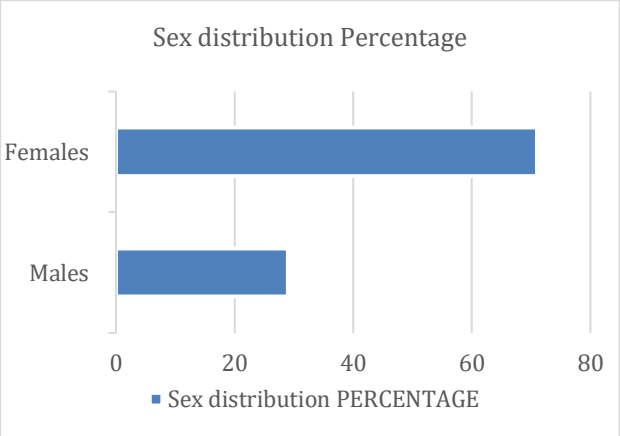

Figure 2: Chart of sex distribution of mask induced facial dermatoses.

Type of mask

Nearly 184 participants (46%) were wearing cloth masks in our study followed by surgical mask (37%) and N95 mask (17%). People using cloth masks were wearing the same mask without washing for 2 to 3 days on average. This can be a possible explanation for occurrence of facial dermatoses like acne mostly in people using cloth masks due to accumulation of sweat and environment dirt because of inadequate washing and hygiene practices (Figure 3).

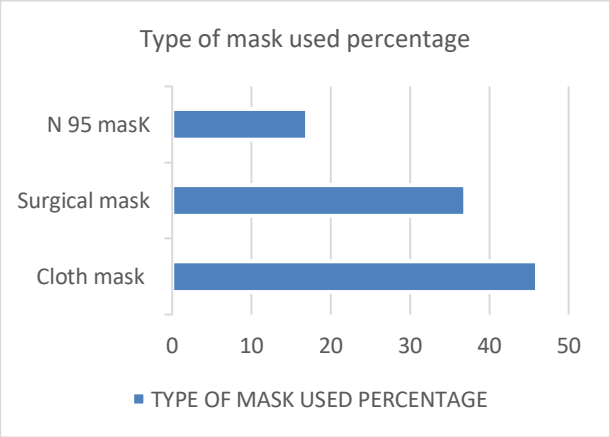

Figure 3: Chart of percentage of types of mask used.

Hours per day of mask usage

Nearly 232 participants (58%) were using mask <6 hours per day on average followed by 140 patients (35%) for 6-12 hours and 28 patients (7%) for >12 hours on average. This shows that mask induced facial dermatoses were common even in people using mask for <6 hours per day (Figure 4).

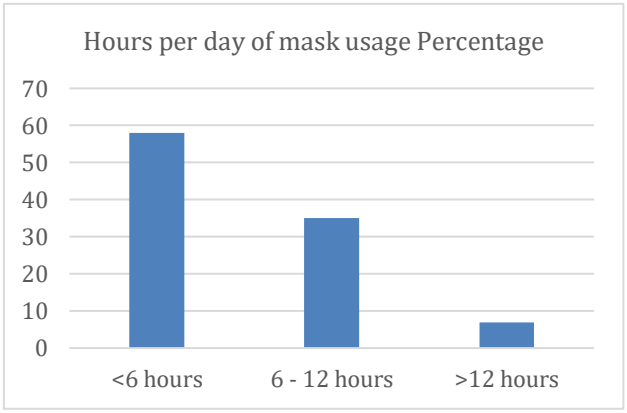

Figure 4: Chart of hours per day of mask usage.

Acne due to prolonged mask usage

43% of the participants (172 patients) had acne (Figure 8) due to prolonged mask usage (Figure 5) out of which 39% (67 patients) reported new onset acne and 61% (105 patients) reported flare up of previously existing acne (Figure 6). 57% of the participants (228 patients) had no acne during the entire period of mask usage. The most common symptom associated with acne was itching in 21% (37 patients) followed by pain in 17% (29 patients), burning sensation in 9% (15 patients) and 53% (91 patients) reported no symptoms.

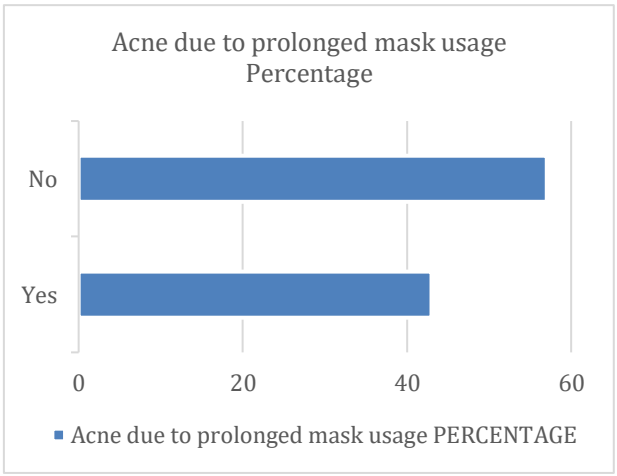

Figure 5: Chart of percentage of acne due to prolonged mask usage.

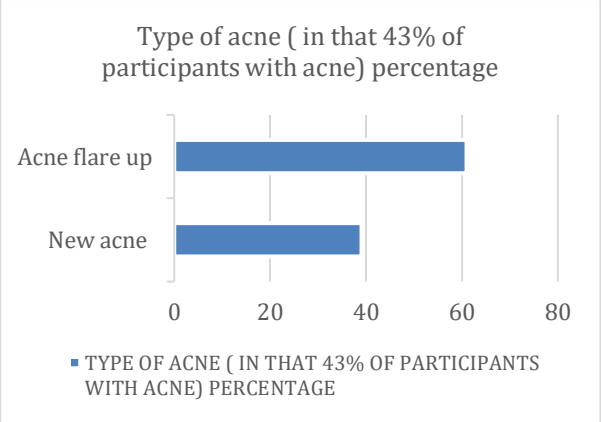

Figure 6: Chart of percentage of new acne and flare up of previously existing acne among those 43% of participants in figure 5.

Dermatoses other than acne

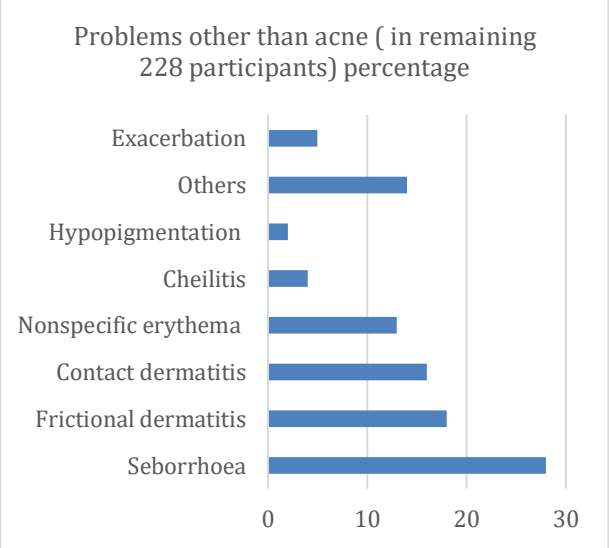

Figure 7: Chart of the facial dermatoses other than acne.

57% of the participants (228 people) had facial dermatoses other than acne out of which Seborrhoea (28%) is the most common followed by frictional dermatitis (18%), contact dermatitis (16%), non-specific pruritus (14%), non-specific erythema (13%), exacerbation of previously existing conditions like seborrheic dermatitis, molluscum contagiosum and atopy (5%), cheilitis (4%), hypopigmentation in the area of mask zone due to sparing from sun exposure (2%). The most common facial dermatoses other than acne was seborrhoea where patients complained of oily skin which was normal previously. Followed by seborrhoea patients complained of frictional dermatitis over the area where the edges of mask rub against skin. The most commonly affected areas are bridge of nose, cheeks and retro auricular areas. Contact dermatitis was mostly reported after frictional dermatitis where patients complained of itching and burning sensation around nose and cheeks. Patients using cloth masks mostly had allergic contact dermatitis whereas patients using N95 masks mostly had irritant contact dermatitis. Many patients had nonspecific pruritus where no skin lesions were present and patients only had itching around nose and cheeks. Few patients had exacerbation of previously existing skin conditions like seborrheic dermatitis, molluscum contagiosum and atopy. Exacerbation of molluscum contagiosum was reported in one patient where the patient had itching over the area of mask usage and lesions of molluscum developed over that area due to Koebnerization effect. Few patients had lesions like cheilitis and area of hypopigmentation over mask area due to increased sun exposure in mask free areas (Figure 7).

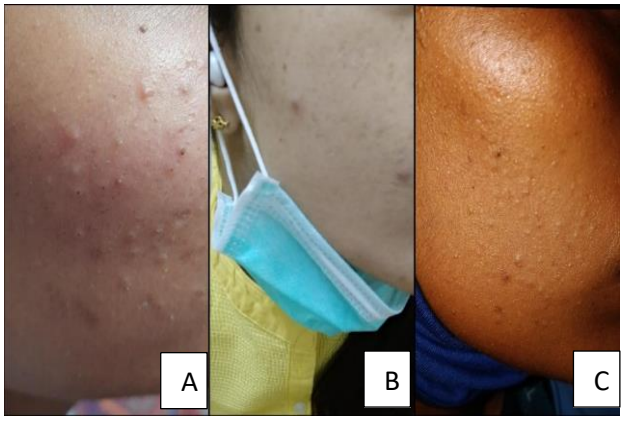

Figure 8: Pictures A, B and C of mask induced acne.

DISCUSSION

During the COVID-19 pandemic, many health care workers are predisposed to newly reported adverse skin reactions to personal protective equipment including face masks. Prolonged contact with face masks is reported to cause many facial dermatoses other than acne in health care workers. A sudden behavioural change among general public in the form of widespread mask usage is known to cause various facial skin problems though it is a must to lower the risk of virus transmission.[2] Face masks in the general population are usually worn for a much shorter time, generally only when people are in public spaces. In a study by Szepietowski et al face masks are reported to induce itching especially in people with pre-existing atopy, acne, rosacea, seborrheic dermatitis.[3]

In a study by Chaiyabutr et al in Thailand, the most common adverse skin reaction to face masks usage was reported to be flare up of previously existing acne.[2] This correlates with our study where the most common facial dermatoses reported was acne flareup. Acne was the most common facial dermatoses reported in 43% of the patients in our study of which most of the patients presented with flare up of previously existing acne. The reason could be increased ambient humidity and temperature inside the area of mask. High temperature has a close correlation with the excretion of sebum where

the sebum excretion increases by 10% for 1 degree Celsius accompanied by increase in squalene in skin surface lipid.[4] Also, the high humidity leads to increased skin hydration which leads to occlusion of pores and irritates the pilosebaceous ducts. These changes along with swelling of epidermal keratinocytes due to increased sweating inside mask, causes acute obstruction of the pilosebaceous follicle and aggravates acne.[5] Also the skin barrier disruption due to change in skin surface sebum composition and increased skin hydration leads to imbalance in bacterial microflora which aggravates acne.[6]

Figure 9: A) Cheilitis, B) exacerbation of seborrheic dermatitis and C) non-specific erythema.

Figure 10: A) Frictional dermatitis to sharp edges of N95 mask and B) mask induced molluscum contagiosum.

Apart from acne, the second most common facial dermatoses reported in our study was frictional dermatitis (Figure 10). In study by Singh et al on PPE induced facial dermatoses in healthcare workers frictional dermatoses was noted in 25% of the patients.[7] In ours study frictional dermatitis occurred mostly in patients wearing N95 mask followed by surgical masks. The most common sites involved were bridge of nose, cheeks and retro auricular areas where the sharp edges of the mask constantly rub over the skin which leads to skin barrier disruption causing frictional dermatitis. The skin over the nasal bridge is most vulnerable to injury because it is a bony prominence. The skin is thinner with little underlying tissue. Shifting of the mask causes friction and shear, and moisture accumulation contributes to the development of skin damage over time.[8] Mask induced frictional dermatitis can be prevented by following few steps before wearing face masks that includes washing your face and applying a moisturizer that contains dimethicone preferably at least 30 minutes to 1 hour before wearing mask so that the moisturizer gets absorbed completely and face is completely dry while wearing mask. If possible an alcohol free skin barrier wipe can be used over the areas like bride of nose where there is more chance for friction by mask.[8] Also it is important that you take regular breaks from wearing a mask to relieve the pressure and reduce moisture build-up.[9]

Mask induced contact dermatitis was commonly reported after frictional dermatitis. It included both allergic and irritant contact dermatitis. In a study by Singh et al PPE induced facial dermatoses, contact dermatitis was reported in 39.5% of the patients and was the most common finding in their study population.[7] True allergic contact dermatitis may occur to adhesives used in the masks or to mask components such as rubber straps or metal clips.[10] Polyurethanes, which are being used increasingly in the production of various products, including the sponge strip inside the mask, are produced by the reaction of diisocyanates and may cause Allergic contact dermatitis or precipitate asthma attacks.[11] Allergic reactions to other residual cross linkers like toluene-2,4-diisocyanate (TDI), 4,4'-diaminodiphenylmethane (MDA) and hexamethylene diisocyanate (HDI) can also occur.[11] The free formaldehyde present in certain types of N95 masks are reported to cause allergic contact dermatitis in patients wearing N95 masks.[12] Facial allergic contact dermatitis can mimic other diseases, such as acute cutaneous lupus erythematosus, seborrheic dermatitis, and sarcoidosis. In contrast to allergic contact dermatitis Irritant contact dermatitis due to face mask is non-immune and is mainly due to skin barrier disruption.

Nearly 14% of the patients in our study reported nonspecific pruritus due to face mask. In a study conducted by Foo et al Adverse skin reactions to PPE against SARS in 2006, facial itching due to mask usage was reported in 51.4% of the study participants.[10] People with sensitive skin and atopy predisposition are more prone for developing facial itch due to mask usage. Frequent scratching of skin over face to alleviate itching can lead to skin barrier disruption. Skin barrier disruption may create a portal of entry for COVID-19, as angiotensin-converting enzyme 2, cell receptor for Severe acute respiratory distress-related Coronavirus-2 (SARS-CoV-2), is abundantly present in blood vessels of skin and basal layer of epidermis.[13] Facial dermatoses induced skin barrier disruption and irritation, and frequent touching of face due to latter, may increase exposure and entry of SARS-CoV-2 infection in healthcare workers.[7]

In a study adverse skin reactions following different types of mask usage during COVID-19 conducted by Chyada et al erythematous rash was reported to occur in 12.7% of

patients.[2] This correlates with study where nonspecific erythema was reported in 13% of study participants. Only nonspecific erythematous rash was present in areas like cheeks, chin without any itching or burning sensation.

Exacerbation of previously existing dermatoses were present in 5% of study participants. Patients with seborrheic dermatitis and atopy reported exacerbation of those conditions on prolonged mask usage. In a study conducted by Chayada et al worsening of pre-existing dermatoses was reported in 3.6% of the patients.[2] In a study conducted by Foo et al, face mask induced itch was present mostly in patients with pre-existing dermatoses like seborrheic dermatosis. In one patient with pre-existing molluscum contagiosum, exacerbation of lesions over face were present due to prolonged mask usage (Figure 10). This can be attributed to the effect of pseudo-Koebnerization which is due to seeding of infectious agents along with sites subjected to trauma, usually from scratching.[14] In this case it can be attributed to the itching and scratching due to prolonged mask usage that lead to pseudo-Koebnerization.

Cheilitis like lesions were present in 4% of our study participants (Figure 9). In a study conducted by Mehak Singh et al, cheilitis was frequently present in health care workers involved in COVID-19 duties. Though healthcare workers are most commonly affected by cheilitis, due to sudden change in behaviour of regular mask usage general public also affected. Most common presentations were tightness, chapping, burning sensation and itching.[15] Generalized lip dryness also called as cheilitis simplex was most frequent pattern of cheilitis reported in their study which correlates with study.

A unique feature of facial dermatoses due to mask usage noted in our study was the area of hypopigmentation in the mask area (cheeks, nose, chin) due to relatively more sun exposure of mask-free areas of face which caused tanning in those areas (forehead, temples). It was noted in 2% of the study participants.

As the present COVID-19 pandemic is not over yet, the different patterns of mask induced facial dermatoses are known to expand further in the upcoming days. Hence it is necessary for dermatologists to be aware of the different presentations of mask induced dermatoses to avoid unnecessary diagnostic errors and panic in the general public. As mask usage cannot be completely abandoned in the present situation it is necessary to follow preventive measures to avoid appearance of new dermatoses or exacerbation of previously existing dermatoses. Air-conditioning, proper fitting masks, use of better-quality masks, applying moisturizer 30 minutes to 1 hour before wearing mask, using an alcohol-free skin barrier wipe, regular breaks with removal of mask and wiping of skin to remove sweat may help in alleviation of dermatoses both in health care workers and the general public. Treating these dermatoses may prevent also COVID-19 contagion, because facial skin damage causes pruritus, which may induce the wearer to scratch the face and/or to remove the mask,[4] with a consequent reduction in PPE effectiveness.[16]

CONCLUSION

Mask induced facial dermatoses has been recently detected in many healthcare workers and also in general public due to regular mask usage in the ongoing COVID-19 pandemic. Though the different patterns of mask induced dermatoses keep on expanding, mask usage cannot be avoided completely to prevent the risk of virus transmission. Hence dermatologists must be aware of the general simple preventive measures to avoid the emergence of new dermatoses and prevent the exacerbation of pre-existing dermatoses in both healthcare workers and also the general public. As frequent itching due to mask induced facial dermatoses can lead to scratching to alleviate the symptoms, which in turn can cause damage to the skin barrier allowing easier transmission of the virus. Hence prevention of mask induced facial dermatoses plays an important role in reducing the risk of virus transmission and also to avoid unnecessary diagnostic errors in the present COVID-19 pandemic.

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Ethical approval: The study was approved by the institutional ethics committee

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