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Short communication

## Using Body Temperature (Pyrexia) to Screen or Triage for Severe Acute Respiratory Syndrome Corona-2 Virus Infection: How Reliable?

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### Abstract

Although, information is limited on the duration of fever in SARS-CoV-2 infection, high body temperature is one of the symptoms of the infection and it is used to identify or monitor persons who are in contact with known infection as well as screen apparently healthy individuals for likelihood of infection with the pathogen. This study was carried out to evaluate the reliability of using body temperature to screen for possibility of SARS-CoV-2 infection. Body temperature of each of the 629-study participant was recorded using an infrared digital thermometer, swab samples collected from the upper nostrils and oro-pharynx and tested for presence of SARS-CoV-2 by PCR. None of the 15 participants who were positive for SARS-CoV-2 had body temperature of above 37°C as at the time of sample collection. In conclusion, the practice of measurement of body temperature to triage or identify SARS-CoV-2 infected persons who may be shedding the virus may be largely misleading.

**Key Words:** SARS-CoV-2, body temperature, Ibadan community

### INTRODUCTION

Pyrexia is a prominent feature of infectious state in human and vertebrate animals. In addition, rise in body temperature is also associated with metabolic and physiological changes and alteration in the immune system of the vertebrate body (Mabey *et al.*, 2004; Mackowiak, 2005; Ogoina, 2011). Thus, fever and the febrile state remain one of the changes in the response of the body to injury particularly due to infectious agents (Dinarelo *et al.*, 2005; Falase and Akinkugbe, 2007; Ogoina, 2011). Consequently, fevers are often considered vital in the diagnosis, treatment as well as follow up of many illnesses and exposure to infectious agents (Falase and Akinkugbe, 2007; Muhammad *et al.*, 2020). It is one of the symptoms used to identify persons with manifestation of body response to infection (Ogoina, 2011). Clinically, fever ranges from mild to very high as one of the typical symptoms of virus infections (Ogoina, 2011). Viral fever can be intermittent, remittent, continuous or sustained, hectic or relapsing (Falase and Akinkugbe, 2007). It is known that the type of infection causing the fever usually determines the duration. Fever due to virus infections can last as short as 2-3 days and sometime as long as two weeks (Ogoina, 2011).

Although, information is limited on the duration of fever in Severe Acute Respiratory Syndrome Corona-2 Virus (SARS-CoV-2) infection, high body temperature is one of the symptoms of the infection and it is used to identify or monitor persons who are in contact with known infection as well as screen apparently healthy individuals for likelihood of infection with the pathogen (Muhammad *et al.*, 2020; Anon,

2020). This study was carried out to evaluate the reliability of using body temperature to screen for possibility of SARS-CoV-2 infection.

### MATERIALS AND METHODS

**Study Location:** This study was carried out in Ibadan, southwest Nigeria, a metropolitan city is located about 128 km northeast of Lagos and 530km southeast of Abuja, the federal capital territory with a projected urban population size of about four million (Population Stat, 2017-2021). The indigenous people of Ibadan are Yorubas but the city is also inhabited by large populations of other Nigerian tribal and ethnic groups as well as some foreigners. Ibadan is the capital of Oyo State and the 3rd most populous city in Nigeria. It is the country's largest city by geographical area.

**Study Population:** The study was cross sectional and involved two broad groups of people. Cohort of predominantly male occupational group and mixed population of male and female persons from two indigenous open markets in the central parts of the city of Ibadan. The cohort of male occupational group was followed up for two months with testing of the same persons for SARS-CoV-2 infection at two weeks interval, while sample was collected once from the adult volunteer men and women groups in the two large markets in Ibadan, namely, Sango and Oje.

**Collection of Swab Samples and Measurement of body temperature:** After due consultation and approval by

leaderships of the various population groups, individuals were informed about the sampling, collection and testing procedures for SARS-CoV-2 infection. Consenting persons were enrolled using a structured form to capture their demographic data as well as history of illness in the previous two weeks and any symptoms of illness at presentation. Thereafter, body temperature of each participant was recorded using an infra-red digital thermometer (ECOMED MODEL 23400, China), followed by collection of swab samples from the upper nostrils and another from the oro-pharynx. The swab samples in viral transport medium were kept in insulated boxes containing frozen iced packs on the field and during transportation to the laboratory in the Department of Virology, University College Hospital, Ibadan where the specimens were kept at -80° C in an ultra-low freezer until tested for presence of SARS-CoV-2 genes by RT-PCR.

Data captured from each participant was transferred into a desktop computer in the laboratory using SPSS software.

**RESULTS**

The demographic characteristics of all participants in the study are shown in Table 1. A total of 629 (377 Female, 252 Male) persons from three locations in Ibadan participated in the study. Age of the participants ranged from 15 to 100 years with a mean of 44 years. Number of persons enrolled from the male dominated Artisan center at Bodija is 148 (23.5%), Oje Market 276 (43.9%) and Sango Market, 205 (32.6%). Body temperature of the participants ranged from 35 oC to 37 oC with a mean of 36.96°C. Overall, 15 (2.4%) of the participants were positive for SARS-CoV-2 genes in their swab samples by RT-PCR, 6(88.0%) of those that were positive for presence of SARS-CoV-2 in their swab samples had body temperature of 36 oC while one person each had 35 °C. (12.5%) and 37 °C respectively (Table 2).

**Table 1:**  
Demography of study participants

	Oje No (%)	Sango No (%)	Mechanic village No (%)	Total No (%)
<b>AGE</b>				
<20	18 (6.5)	17 (8.3)	31 (20.9)	66 (10.5)
21-30	28 (10.1)	29 (14.1)	17 (11.5)	74 (11.8)
31-40	63 (22.8)	37 (18.0)	25 (16.9)	125 (19.9)
41-50	69 (25.0)	44 (21.5)	37 (25.0)	150 (23.8)
51-60	63 (22.8)	38 (18.5)	22 (14.9)	123 (19.6)
>60	35 (12.7)	40 (19.5)	16 (10.8)	91 (14.5)
Total	276	205	148	629
<b>SEX</b>				
Male	79 (28.6)	44 (21.5)	129 (87.2)	252 (40.1)
Female	197 (71.4)	161 (78.5)	19 (12.8)	377 (59.9)
Total	276	205	148	629

**DISCUSSION**

It is known that majority of cases of fever are due to infection with pathogens (Falase and Akinkugbe, 2007). Hence assessment of patients in the infectious clinics generally includes documentation of body temperature. Fever is almost a common feature in viral infections (Ogoina, 2011) thus it is understandable that it occurs early in the pathogenesis of SARS-CoV-2 infection (Muhammad et al., 2020). However the

reliability of a protocol that is based on measurement of body temperature in public places to identify and separate persons with SARS-CoV-2 infection from others or triaging in hospitals is doubtful. Results of this study show that none of the 15 positive persons from the 629 participants tested for SARS-CoV-2 at the community level in Ibadan, Oyo State, Nigeria had body temperature that was above 37 °C at the time they were tested. While they may have had fever during the early stage of the infection, the 15 positive persons that were positive for SARS-CoV-2 at the community level in this study were possibly shedding without fever as ascertained by 2 persons that were continuously positive for the virus up to 2 – 4 weeks among members of the Artisan group at Bodija, Ibadan that were followed-up for 12 weeks after the initial diagnosis using RT-PCR, that is, they were asymptotically infected during the time.

**Table 2:**  
COVID-19 infection and body temperature of study participants in Ibadan

	Oje Market	Sango Market	Bodija (male dominate d artisan group)	Total	Body Temperature 0C Mean (range)
Tested	276	205	148	629	35.96 (35-37)
Positive (%)	8 (3.3)	5 (2.4)	2 (1.4)	15 (2.4)	36.0 (35-37)
Negative (%)	268 (97.1)	200 (97.6)	146 (98.6)	614 (97.6)	35.9 (35-37)

Guan et al. (2020) described fever as a complex cytokine-mediated physiological response that stimulates COVID-19. However, the duration of fever in SARS-CoV-2 infection varies widely among individuals similar to the situation in many other virus infections. Chen et al. (2020) reported that SARS-CoV-2 infected persons who received critical care (ICU) services were more likely to have longer duration of fever than the COVID-19 patients who did not receive ICU care. It varies from 31 days to 9 days after onset of symptoms, respectively. On the other hand, Guan et al. (2020) reported that fever resolved in less than 9 days in many SARS-CoV-2 patients in China.

Fever occurs as part of the body response to infection with SARS-CoV-2. Its duration may also vary with geographical regions due to differences in tolerance to infectious agents by people in different parts of the world (Ogoina, 2011). It is known that the frequency of occurrence of fever in Africa is very high because of endemicity of pathogenic microorganisms in the region coupled with warm weather (often 26 oC - 30 oC , or higher) and high humidity (over 80% in many parts), a combination which supports rapid growth of infectious pathogens. Africans have largely adapted to high frequency of exposure to infectious agents and sustenance of physiological ability to control of fever. Thus, it is not surprising that high proportion of persons infected with SARS-CoV-2 are able to control the fever even when they are still viremic. In conclusion, the practice of measurement of body temperature to triage or identify SARS-CoV-2 infected persons who may be shedding the virus may be largely misleading.

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