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2023년 온열질환 응급실감시체계 운영 결과

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질병관리청 건강위해대응관 미래질병대비과

초 록

질병관리청은 2011년부터 전국 500여 개 응급실 운영 의료기관을 대상으로 매년 여름철 폭염으로 인한 열사병, 열탈진, 열경련, 열실신, 열부종 등의 온열질환 발생 상황을 모니터링하는 「온열질환 응급실감시체계」를 운영하고 있다. 2023년 온열질환 응급실감시체계에는 504개 의료기관이 참여하였고, 운영기간 동안(2023년 5월 20일-9월 30일) 신고된 온열질환자는 2,818명이었으며, 그중 추정 사망자는 32명이었다. 2023년 5-9월 폭염일수는 14.2일로 2022년 10.6일과 비교하여 3.6일 증가했다. 2023년 6-8월 전국 평균기온은 24.7℃로 평년(과거 30년) 23.7℃와 비교하여 1.0℃ 높았던 것으로 나타났다. 전년 대비 온열질환자 수는 80.2% 증가하였다. 신고된 온열질환자는 남자가 2,192명(77.8%)으로 여자 626명(22.2%)보다 많았고, 연령별로는 50대 21.3% (601명), 60대 18.2% (514명), 40대 13.7% (385명) 순으로 많았다. 발생장소는 실외가 79.6% (2,243명)로 실내 20.4% (575명)보다 3.9배 많았고, 실외 작업장에서 32.4% (913명)로 가장 많이 발생한 것으로 나타났다. 그중 2023년 신고된 추정 사망자는 총 32명으로 전년과 비교하여 255.6% 증가하였고, 추정 사망자의 사인은 주로 열사병(90.6%)으로 신고되었다. 앞으로 폭염으로 인한 건강 피해는 증가할 것으로 예상되어서 건강 영향에 대한 정보공유와 감시의 중요성이 더욱 커질 것으로 예상된다.

주요 검색어: 감시체계; 온열질환; 폭염; 열사병

서 론

2023년 지구 기후 현황 보고서에 따르면 2023년이 가장 더운 해로 기록되었으며, 지구 평균 표면 근처 온도는 산업화 이전 기준보다 섭씨 1.45℃ (불확실성은 ±0.12℃) 높았다고 한다[1].

2023년에는 세계 여러 지역에서 심각한 폭염이 많이 발생하였다. 가장 심각한 폭염 중 일부는 남부 유럽과 북아프리카에서 발생했으며, 특히 7월 하반기에 심각하고 지속적인 폭염이 발생하였다. 극심한 더위는 7월 말에 유럽 남동부로 이동했고, 8월 말과 9월 초에는 유럽 중서부 지역에 더 많은 폭염이 영향을 미쳤다[1]. 앞으로 고온으로 인한 건강위험 또한 지구 온난화의 영향으로 지속적으로 증가할 것이며[2], 기후변화는 건강에 악영향을 미칠 것으로 예상된다[3].

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이주현, 안대식, 안윤진 현재 소속: 질병관리청 건강위해대응관 기후보건 · 건강위해대비과

핵심요약

① 이전에 알려진 내용은?

지구의 평균기온 상승으로 인한 폭염 건강 피해가 증가하고, 경제적 손실도 예측되고 있다. 최근 5년간(2019–2023년) 온열질환 응급실감시체계로 신고된 온열질환자는 연평균 1,735명으로 매년 지속적으로 발생하고 있다.

② 새로이 알게 된 내용은?

온열질환자는 주로 남자(77.8%), 50대(21.3%)에서 많았고, 발생장소는 실외 작업장 913명(32.4%), 논/밭 395명(14.0%), 길가 286명(10.1%) 순으로 많았다. 낮 시간대(12–17시)에 많이 발생했고(49.9%), 질환은 열탈진(1,598명, 56.7%), 열사병(493명, 17.5%)이 많았다. 실외(79.6%) 발생이 실내(20.4%)보다 3.9배 많았고, 실외 작업장(32.4%)에서 많이 발생했다.

③ 시사점은?

온열질환은 사전에 적절한 조치로 사고를 방지할 수 있으므로, 건강한 여름나기를 위해서는 폭염 대비 건강수칙을 준수해야 한다.

Intergovernmental Panel on Climate Change 제6차 보고서에 따르면 전 지구 표면 온도는 산업화 이전 대비 이미 1.1℃가 올랐다. 지구 온난화도 예상보다 빨리 진행되고 있으며, 2040년 이전에 1.5℃가 상승할 것으로 예측된다. 지구의 온도는 2100년까지 산업화 이전 대비 약 3.2℃ 상승할 것이라고 한다. 지구 온난화로 지구의 온도가 0.5℃ 증가하면 극한 고온 및 위험한 고온다습 환경의 강도 및 빈도 증가와 함께 사망률, 이환율, 노동 생산성 손실을 증가시킬 것이다. 지구 온도가 2100년까지 2℃ 상승하면 현존하는 동식물 종의 18%가 멸종 위기에 처할 전망이고, 4℃ 상승하면 초 단위로 우리가 알고 있는 동식물이 생존의 위협에 처할 전망이라고 한다. 특히 고산지대나 극지방과 같은 추운 지역을 선호하는 동물의 멸종 가능성이 크다고 한다[4].

우리나라도 폭염일수는 꾸준히 증가했고, 평균기온도 상승했다[5]. 이러한 환경 변화는 온열질환의 발생 빈도를 증가시키며, 이는 국민 건강에 심각한 위협을 초래하고 있다. 온열질환은 고온 환경에서 신체가 과도한 열에 노출되었을 때 발생하는 질병으로, 열사병, 열탈진, 열경련 등의 형태로 나타난다. 이러한 질환은 빠른 진단과 치료가 이루어지지 않으면 생명에 치명적인 결과를 초래할 수 있다. 질병관리청은 2011년부터 온열질환 응급실감시체계를 운영하고 있으며, 폭염으로 인한 건강 피해 발생을 모니터링하고 주요 발생 특성 정보를 즉시 제공하고 있다. 본 보고서는 2023년도 온열질환 응급실감시체계의 주요 운영 결과를 분석하고, 이를 통해 얻어진 주요 결과와 시사점을 제시하고자 한다.

방 법

2023년 여름철(5–9월) 온열질환 응급실감시체계는 응급실을 운영하는 전국 504개 의료기관이 감시체계에 참여하였으며, 온열질환으로 응급실에 내원한 환자를 대상으로 하고 있다. 질병관리청 질병보건통합관리시스템을 통해 신고된 자료는 관할 보건소와 시·도의 승인을 거쳐 질병관리청에서 최종 승인 후 감시 정보를 집계하는 방식으로 운영되고 있다. 감시체계 운영 기간 중 수집된 정보는 기간별(일별, 누계), 지역별(시·도, 시·군·구), 주요 발생 특성별로 정리하여 매일

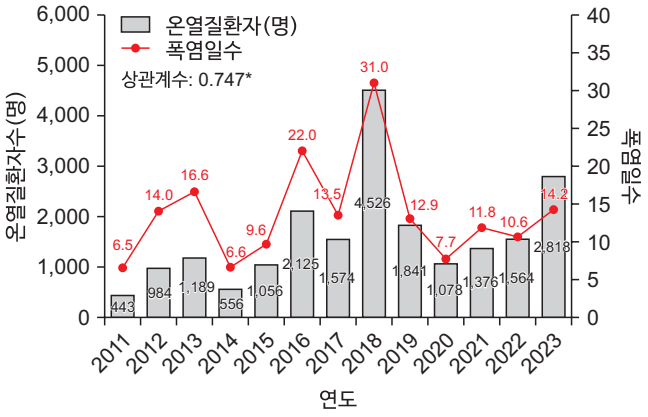

그림 1. 연도별 온열질환 응급실감시체계 운영 결과와 폭염일수

*p<0.01. Adapted from the article of Park et al. (Public Health Wkly Rep 2023;16:241-52) [6].

16시에 질병관리청 누리집에 게시하고 있다.

본 보고서는 2023년 5월 20일부터 9월 30일까지 신고된 일별 온열질환 감시자료를 대상으로 Python 3.12.3을 이용하여 주요 발생 특성별로 자료를 분석하였다.

결 과

지난 13년간(2011–2023년) 온열질환 응급실감시체계로 신고된 연평균 온열질환자는 1,625명이었고(그림 1) [6], 사망자는 13.2명으로 매년 지속적으로 온열질환자는 발생하고 있다. 2023년 온열질환 응급실감시체계를 통해 신고된 온열질환자는 총 2,818명으로 전년 대비 80.2% 증가하였고(2022년 1,564명), 온열질환 추정 사망자는 총 32명으로 전년 대비 255.6%가 증가하였다(2022년 9명). 2023년 여름철 주요 기상 상황을 살펴보면 폭염일수는 14.2일로 2022년(10.6일)에 비하여 3.6일 증가하였다(표 1) [6]. 기상청에 따르면 6월 전국 평균기온은 22.3℃로 평년 대비 0.9℃ 높았고, 7월은 25.2℃로 0.9℃ 높았으며, 8월은 26.4℃로 1.3℃ 높았다. 여름철(6–8월) 전국 평균기온은 24.7℃로 평년(과거 30년) 23.7℃와 비교하여 1.0℃ 높았던 것으로 나타났다. 감시

표 1. 연도별 감시체계 운영 결과(2011–2023년)

연도	운영 기간	온열질환자[a)]	추정 사망자	폭염일수[b)]
2011	7.1.–9.3.	443	6	6.5
2012	6.1.–9.6.	984	15	14.0
2013	6.2.–9.7.	1,189	14	16.6
2014	6.1.–9.6.	556	1	6.6
2015	5.24.–9.5.	1,056	11	9.6
2016	5.23.–9.21.	2,125	17	22.0
2017	5.29.–9.8.	1,574	11	13.5
2018	5.20.–9.10.	4,526	48	31.0
2019	5.20.–9.20.	1,841	11	12.9
2020	5.20.–9.13.	1,078	9	7.7
2021	5.20.–9.30.	1,376	20	11.8
2022	5.20.–9.30.	1,564	9	10.6
2023	5.20.–9.30.	2,818	32	14.2

단위: 명 또는 일. [a)]온열질환자는 '온열질환 추정 사망자'를 포함하는 수치임. [b)]기상청 기상자료개방포털. Adapted from the article of Park et al. (Public Health Wkly Rep 2023;16:241-52) [6].

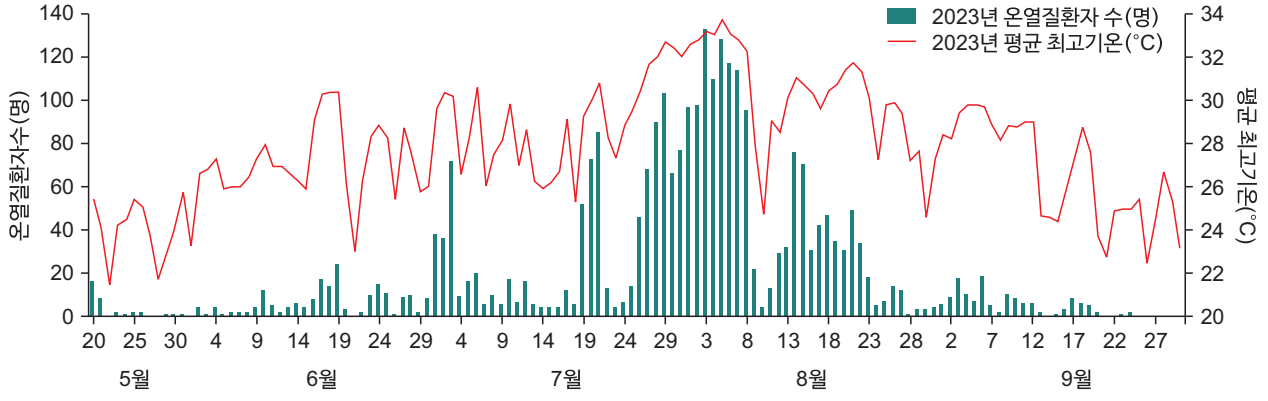

그림 2. 2023년 여름철 일별 온열질환 발생과 일평균 최고기온 현황

기간 동안(5월 20일–9월 30일) 가장 많은 온열질환자가 발생한 날은 2023년 8월 3일로 하루 133명이었다. 8월 3일은 전국 평균기온이 34.1℃로 관측되었고, 특히 강릉 지역은 38.3℃까지 기온이 올랐던 날이었다(그림2). 신고된 온열질환자 특성을 살펴보면, 성별은 남성이 2,192명(77.8%)으로 많았고, 연령별로는 50대가 21.3%로 가장 많은 것으로 나타났다. 인구 10만 명당 연령별 온열질환자 수는 80세 이상에서 11.5명으로 나타나 고령층으로 갈수록 높아지는 경향을 보였다. 지역별로는 경기도가 683명(24.2%)으로 가장 많았고 경북(9.0%), 경남(8.0%), 전남(7.9%) 순으로 나타났다. 인구 10만 명당 지역별 온열질환자 수는 제주도 14.5명, 전남 12.3명, 전북 11.8명, 경북 10.0명 순으로 나타났다. 질환별로는 열탈진이 1,598명(56.7%), 열사병은 493명(17.5%) 순으로 나타났다. 전체 환자 중 실외 활동 중 발생한 온열질환자는 79.6%로 높게 나타났다. 실외 발생을 세부적으로 살펴보면 작업장(32.4%), 논밭(14.0%)과 같은 실외 작업 중에 발생하는 경우가 많은 것으로 나타났다(표 2).

논 의

기후변화로 인한 폭염은 세계 곳곳에서 증가하는 추세를 보이고 있으며 이에 따른 건강피해는 매년 지속적으로 발생하고 있다. 또한 폭염은 노동력의 저하를 일으키는 등 사회에 직접적인 영향을 미친다.

여름철 발생하는 온열질환은 간단한 건강수칙 준수로 그 피해를 줄이거나 예방할 수 있지만, 대처가 소홀하면 인명피해로 이어질 수 있다. 따라서 폭염 시에는 외출할 때 햇볕을 차단할 수 있는 모자나 양산을 챙기고 헐렁한 옷을 입고, 갈증을 느끼기 전에 물을 자주 마시는 것이 좋다. 더운 시간대에는 작업을 피하고 휴식을 취하는 것이 좋다. 특히 노인, 어린이, 임산부, 기저질환자(심혈관질환, 당뇨병, 뇌졸중 등)들은 여러 가지 요인에 의해 온도조절기능이 저하되어, 온열질환에 더 취약하므로 평소 건강관리와 함께 폭염 시 온열질환 예방에 더욱 유의가 필요하다[7].

폭염으로 인한 건강피해를 최소화하기 위해 정부는 관계

표 2. 2023년 온열질환 응급실감시체계 주요 결과

특성	온열질환자 수(%)
성별	
남성	2,192 (77.8)
여성	626 (22.2)
연령별 (세)	
0–9	16 (0.6)
10–19	95 (3.4)
20–29	291 (10.3)
30–39	323 (11.5)
40–49	385 (13.7)
50–59	601 (21.3)
60–69	514 (18.2)
70–79	325 (11.5)
≥80	268 (9.5)
지역별	
서울특별시	201 (7.1)
부산광역시	94 (3.3)
대구광역시	59 (2.1)
인천광역시	113 (4.0)
광주광역시	64 (2.3)
대전광역시	41 (1.5)
울산광역시	68 (2.4)
세종특별자치시	27 (1.0)
경기도	683 (24.2)
강원특별자치도	104 (3.7)
충청북도	151 (5.3)
충청남도	205 (7.3)
전북특별자치도	207 (7.3)
전라남도	222 (7.9)
경상북도	255 (9.0)
경상남도	226 (8.0)
제주특별자치도	98 (3.5)
질환별	
열사병	493 (17.5)
열탈진	1,598 (56.7)
열경련	432 (15.3)
열실신	235 (8.3)
열부종	1 (0.0)
기타	59 (2.1)

표 2. 계속

특성	온열질환자 수(%)
발생장소	
실내	575 (20.4)
집	171 (6.1)
건물	72 (2.6)
작업장	197 (7.0)
비닐하우스	48 (1.7)
기타	87 (3.1)
실외	2,243 (79.6)
작업장	913 (32.4)
운동장(공원)	171 (6.1)
논·밭	395 (14.0)
산	72 (2.6)
강가, 해변	32 (1.1)
길가	286 (10.1)
주거지 주변	105 (3.7)
기타	269 (9.5)

부처 분야별로 체계적으로 각각의 폭염 대책을 추진하고 있다. 범정부 폭염 종합대책 기간(매년 5월 20일–9월 30일) 동안 질병관리청은 폭염으로 인한 건강피해 발생을 신속하게 파악하기 위하여 「온열질환 응급실감시체계」를 지속적으로 운영할 예정이다. 수집된 발생현황은 감시기간 동안 질병관리청 누리집(http://www.kdca.go.kr)을 통해 일 단위로 매일 오후 16시에 제공하고 감시 종료 후에는 매년 「폭염으로 인한 온열질환 신고현황 연보」를 발간하여 폭염 대응 및 정책 수립의 근거 자료로 제공하고 있다.

Declarations

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Conflict of Interest: The authors have no conflicts of interest to declare.

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Results of Operating the 2023 Heat-related Illness Surveillance System

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ABSTRACT

Since 2011, the Korea Disease Control and Prevention Agency has been operating a "Heat-related Illness Surveillance System" to monitor the occurrence of illnesses (such as heatstroke, heat exhaustion, heat cramps, heat syncope, and heat edema) caused by heat waves at approximately 500 emergency room-operating medical institutions nationwide during the summer. In 2023, 504 medical institutions participated in the Heat-related Illness Surveillance System, and during the operation period (May 20, 2023, to September 30, 2023), 2,818 patients were reported to have heat-related illnesses, of whom 32 were presumed to have died. The number of patients with heat-related illnesses increased by 80.2% compared with the previous year. Among the reported patients with heat-related illnesses, there were more male patients (77.8%, 2,192) than female patients (22.2%, 626). By age, individuals in their 50s, 60s, and 40s accounted for 21.3% (601), 18.2% (514), and 13.7% (385) of the patients. The locations of illness occurrence were outdoors in most cases (79.6%, 2,243), and the percentage of corresponding cases was 3.9 times higher than that of the cases in which the illness occurred indoors (20.4%, 575), and outdoor workplaces accounted for the largest proportion of cases (32.4%, 913). The estimated number of deaths reported in 2023 was 32, a 255.6% increase from the previous year, and the cause of death was mainly heatstroke (90.6%). Health damage due to heat waves is expected to increase in the future. Therefore, information sharing regarding and monitoring the impact of heat waves on health are expected to become even more important.

Key words: Surveillance system; Heat-related illness; Heat wave; Heat stroke

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Introduction

According to the "State of the Global Climate 2023" report, 2023 was the hottest year on record, with the global mean surface temperature (GMST) being 1.45℃ (uncertainty of ±0.12℃) higher than the pre-industrial level [1].

In 2023, several regions worldwide experienced severe heat waves. Some of the most severe and persistent ones occurred in southern Europe and North Africa, especially in the second half of July. Southeastern Europe experienced extreme heat at

Key messages

① What is known previously?

Not only is the health damage from heat waves increasing owing to the increase in the Earth's average temperature but also related economic losses have been predicted. Over the past 5 years (2019–2023), the average number of people with heat-related illnesses reported through the Heat-related Illness Surveillance System was 1,735 per year.

② What new information is presented?

Patients with heat-related illnesses were mainly male (77.8%) and individuals in their 50s (21.3%), and the places of occurrence were as follows: outdoor workshops (913 patients [32.4%]); rice fields/fields (395 patients [14.0%]); and roadsides (286 patients [10.1%]). In most cases, the illness onset was during the day (12 to 5 PM, 49.9%), and the most common illnesses were heat exhaustion (1,598 patients [56.7%]) and heat stroke (493 patients [17.5%]). The percentage of cases in which the illness occurred outdoors (79.6%) was 3.9 times higher than that of the cases in which the illness occurred indoors (20.4%) and outdoor workplaces accounted for the most number of cases (32.4%).

③ What are implications?

Heat-related illnesses can be prevented by taking appropriate measures in advance; therefore, for a healthy summer, precautions must be taken against heat wave exposure.

the end of July while Midwestern Europe faced heat waves in late August and early September [1]. Heat-related health risks are projected to increase due to global warming [2], and climate change is anticipated to have adverse health effects on public health [3].

According to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, the GMST has already increased 1.09℃ since the pre-industrial level. Global warming is occurring faster than expected, and the global temperature is predicted to rise by 1.5℃ before 2040. In addition, the Earth's temperature is expected to be approximately 3.2℃ higher than the pre-industrial level by 2100. A 0.5℃ rise in the Earth's temperature due to global warming will increase mortality and morbidity rates, as well as result in labor productivity losses. Additionally, it will exacerbate the intensity and frequency of humid heat. If the global temperature rises by 2℃ by 2100, 18% of the existing plant and animal species will be at risk of extinction, and a 4℃ rise will threaten the survival of plants and animals as we know them every second. Importantly, animals that inhabit cold environments, such as those in alpine and polar regions, face a greater risk of becoming extinct [4].

The Republic of Korea has also experienced an increase in the number of days affected by heat waves, accompanied by an increase in the average temperature [5]. These environmental changes are increasing the frequency of heat-related illnesses, which pose a serious threat to human health. Heat-related illnesses occur when the body is exposed to excessive heat and include heat stroke, heat exhaustion, and heat cramps. These conditions can be life-threatening if not diagnosed and treated quickly. The Korea Disease Control and Prevention Agency (KDCA) has been operating the Heat-related Illness Surveillance Program since 2011, monitoring cases of heat-related illnesses and providing readily accessible reports on key case characteristics. This report analyze the key operational outcomes of the 2023 Heat-related Illness Surveillance Program and present the implications of the findings.

Methods

In 2023, 504 healthcare organizations and emergency departments (EDs) throughout the nation participated in the 2023 summer (May to September) Heat-related Illness Surveillance Program, which targeted patients who presented to an ED with a heat-related illness. Before any data were uploaded on the KDCA's integrated disease health management system, they were first approved by designated public health centers, cities, and provinces and then given final approval by the KDCA. The information collected during operation of the program was posted on the KDCA's website at 4:00 PM every day and was organized by period (daily and cumulative), region (province, city, county, and district), and key case characteristics.

This report analyzed the daily heat-related illness surveillance data from May 20 to September 30, 2023, by major case characteristics using Python 3.12.3.

Results

Over the past 13 years (2011–2023), the annual average number of patients with heat-related illnesses reported through the surveillance program was 1,625, while the annual average number of deaths was 13.2. These values continue to climb every year (Figure 1) [6]. In 2023, 2,818 cases of heat-related illnesses were reported through the surveillance program, an increase of 80.2% from the previous year (1,564 in 2022), and a total of 32 deaths were presumed to be heat-related, representing an increase of 255.6% from the previous year (9 in 2022). Regarding major weather conditions in the summer of 2023, the number of days affected by heat waves was 14.2 days, an increase of 3.6 days since 2022 (10.6 days) (Table 1) [6]. As reported by the Korea Meteorological Administration, the national average temperatures in June, July, and August were 22.3℃, 25.2℃, and 26.4℃, which were 0.9℃, 0.9℃, and 1.3℃ higher, respectively. Thus, during summer (June–August), the national average temperature was 24.7℃, which was 1.0℃ higher than the 30-year average of 23.7℃. During the surveillance period (May 20–September 30), the number of heat-related illnesses peaked on August 3, 2023, with 133 cases. On August 3, the national average temperature was 34.1℃, with temperatures in Gangneung reaching 38.3℃ (Figure 2). Regarding the characteristics of patients with heat-related illnesses, the majority were male, with 2,192 reported cases (77.8%), and those in their 50s (21.3%). The number of heat-related illnesses per 100,000 people by age was 11.5 for those aged 80 years and older, with an increasing trend observed by age. In terms of region, Gyeonggi-do had the largest number of cases (i.e., 683, 24.2%), followed by Gyeongbuk (9.0%), Gyeongnam (8.0%), and Jeonnam (7.9%). The number of

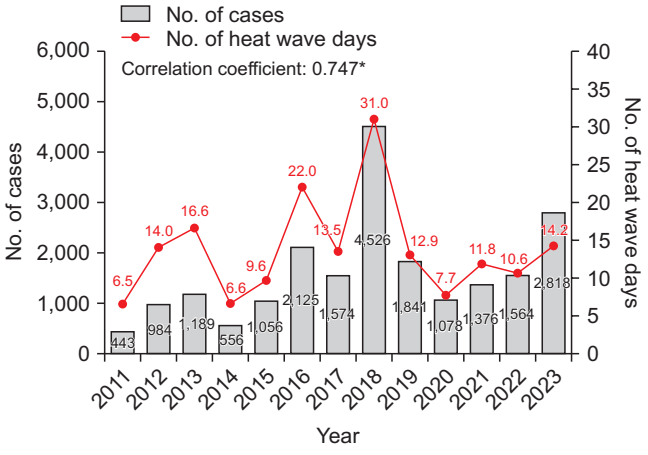

Figure 1. Results of heat-related illness surveillance system operation and number of heat wave days by year

*p<0.01. Adapted from the article of Park et al. (Public Health Wkly Rep 2023;16:241-52) [6].

Table 1. Results of surveillance system operation by year (2011–2023)

Year	Period of surveillance	Total cases[a)]	Deaths (n)	No. of days of heat wave[b)]
2011	July 1–Sept. 3	443	6	6.5
2012	June 1–Sept. 6	984	15	14.0
2013	June 2–Sept. 7	1,189	14	16.6
2014	June 1–Sept. 6	556	1	6.6
2015	May 24–Sept. 5	1,056	11	9.6
2016	May 23–Sept. 21	2,125	17	22.0
2017	May 29–Sept. 8	1,574	11	13.5
2018	May 20–Sept. 10	4,526	48	31.0
2019	May 20–Sept. 20	1,841	11	12.9
2020	May 20–Sept. 13	1,078	9	7.7
2021	May 20–Sept. 30	1,376	20	11.8
2022	May 20–Sept. 30	1,564	9	10.6
2023	May 20–Sept. 30	2,818	32	14.2

Sept=September. [a)]Total cases include death cases. [b)]Korea Meteorological Administration, Open MET Data Portal. Adapted from the article of Park et al. (Public Health Wkly Rep 2023;16:241-52) [6].

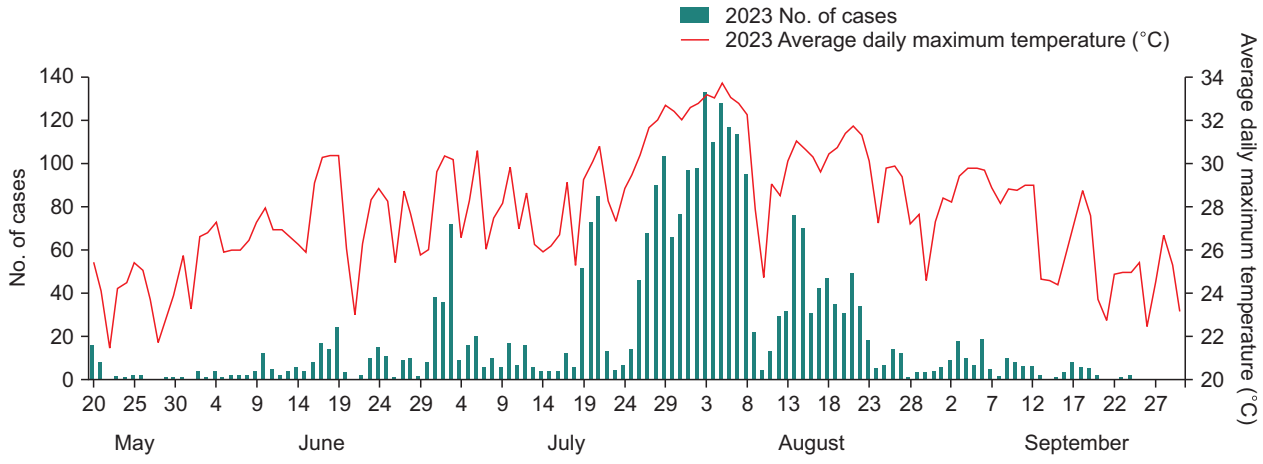

Figure 2. Current status of daily heat-related illness and average daily maximum temperature (℃) in the summer of 2023

heat-related illnesses per 100,000 people by region was 14.5 in Jeju Island, 12.3 in Jeonnam, 11.8 in Jeonbuk, and 10.0 in Gyeongbuk. Regarding the type of illness, heat exhaustion accounted for 1,598 (56.7%) of the cases, followed by heat stroke (i.e., 493 cases, 17.5%). Of all the reported cases of heat-related illnesses, 79.6% occurred while those affected were engaged in outdoor activities. A closer look at outdoor occurrences revealed that individuals affected were often working, for example, in outdoor workshops (32.4%) and fields (14.0%) (Table 2).

Discussion

Heat waves induced by climate change are becoming more frequent in many regions worldwide, resulting in a persistent annual increase in health-related consequences. Heat waves

Table 2. Main results of the 2023 heat-related illness surveillance system

Characteristic	HRI patients (%)
Sex	
Male	2,192 (77.8)
Female	626 (22.2)
Age (yr)	
0–9	16 (0.6)
10–19	95 (3.4)
20–29	291 (10.3)
30–39	323 (11.5)
40–49	385 (13.7)
50–59	601 (21.3)
60–69	514 (18.2)
70–79	325 (11.5)
≥80	268 (9.5)
Region	
Seoul	201 (7.1)
Busan	94 (3.3)
Daegu	59 (2.1)
Incheon	113 (4.0)
Gwangju	64 (2.3)
Daejeon	41 (1.5)
Ulsan	68 (2.4)
Sejong	27 (1.0)
Gyeonggi	683 (24.2)
Gangwon	104 (3.7)
Chungbuk	151 (5.3)
Chungnam	205 (7.3)
Jeonbuk	207 (7.3)
Jeonnam	222 (7.9)
Gyeongbuk	255 (9.0)
Gyeongnam	226 (8.0)
Jeju	98 (3.5)
Diagnosis	
Heatstroke	493 (17.5)
Heat exhaustion	1,598 (56.7)
Heat cramp	432 (15.3)
Heat syncope	235 (8.3)
Heat edema	1 (0.0)
Other effects of heat and light	59 (2.1)
Place of occurrence	
Indoor	575 (20.4)
Home	171 (6.1)
Building	72 (2.6)
Workplace	197 (7.0)
Plastic greenhouse	48 (1.7)
Other	87 (3.1)
Outdoor	2,243 (79.6)
Workplace	913 (32.4)
Playground	171 (6.1)
Farmland	395 (14.0)
Mountain	72 (2.6)
Riverside	32 (1.1)
Roadside	286 (10.1)
Nearby residence	105 (3.7)
Other	269 (9.5)

HRI=heat-related illnesses.

have a direct impact on society, including a decline in the labor force.

Heat-related illnesses occurring during the summer can be reduced or prevented with the adoption of simple health measures; failure to adhere to these recommendations can lead to casualties. For instance, when going out in the heat, bringing a hat or handheld parasol for sun protection is recommended, as is wearing loose-fitting clothing and drinking plenty of water, even before feeling thirsty. Working during the hottest times of the day should be avoided, and taking breaks is suggested. Older adults, pregnant women, and those with underlying medical conditions (e.g., cardiovascular disease, diabetes, and stroke) are especially vulnerable to heat-related illnesses due to decreased thermoregulation; therefore, they should closely adhere to heat-related illness prevention tips during heat waves while sticking to a daily healthcare routine [7].

To minimize the adverse effects of heat waves on health, the government is systematically implementing measures

through relevant ministries and sectors. During the annual government-wide comprehensive planning period (May 20 to September 30), the KDCA will continue to operate the Heat-related Illness Surveillance Program to quickly identify health effects caused by heat waves. Throughout the program, collected data will be posted at 4:00 PM daily on the KDCA website (http://www.kdca.go.kr). When the program ends, the "Annals of Reported Heat-related Illnesses due to Heat Waves" will be published annually to serve as a basis for future heat wave response measures and policy establishment.

Declarations

Ethics Statement: Not applicable.

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Acknowledgments: None.

Conflict of Interest: The authors have no conflicts of interest to declare.

Author Contributions: Conceptualization: DSA, YJA, JHL. Data curation: JHL. Formal analysis: JHL. Investigation: JHL. Methodology: JHL. Visualization: JHL. Writing – original draft: JHL. Writing – review & editing: DSA, YJA.

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