THE STUIES OF SWIMMING POOL FACILITIES OF DALSEO-GU AT DAEGU METROPOLITAN CITY IN KOREA

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ABSTRACT

Swimming is one of great ways to improve our health and wellbeing. Daegu is a Metropolitan city and is located in south-eastern Korea. Data were extracted using a review schema developed by the research team from South Korea's Ministry of Culture, Sports and Tourism and Daegu Metropolitan City. A total of 16 swimming pools were supplied to Daegu Metropolitan City, of which 8 were built in Dalseo-gu. The status of swimming pool use in this Dalseo-gu was compared between 2019 before COVID-19 and 2020 after COVID-19. According to the criteria for classification of public sports facilities, a total of public sports facilities were supplied to Daegu Metropolitan City out of 14,303 facility items as of 2019. The number of sports programs decreased significantly from the previous year to 5,584 in 2020. In 2020, the numbers of swimming lessons and free swimming were decreased significant (p<0.001). The numbers of aquarobics were also decreased significant (p<0.01). The study means that many of swimming people are staying at home. If there is no evidence that the virus that causes COVID-19 can be spread to people through water in swimming pools, the studies illustrate the need for opening swimming pool on civil health in physical activity. Swimming plays a major role in tackling and reducing the obesity.

Keywords: COVID-19, Daegu Metropolitan City, Dalseo-gu, swimming pools.

INTRODUCTION

The concepts of "swimming" and "water activities" have evolved greatly since the first written document on swimming (Nikolaus Wynmann, 1538, "Colymbetes, sive de arte natandi dialogus et festivus et iucundus lectu" ["The Swimmer, or A Dialogue on the Art of Swimming and Joyful and Pleasant to Read"]) (Escalante & Saavedra, 2012). Swimming is an individual or team racing sport that requires the use of one's entire body to move through water. Water exercise leads to less stress and fewer injuries to tendons and joints. It is also taught for lifesaving purposes. Swimming as an exercise is popular as an all-around body developer. Water-based activities such as swimming have long been recognized as extremely beneficial to health and personal well-being (Thomson et al., 2003; Pasquarella et al., 2013). Because there's no impact with swimming, it can be continued for a lifetime. Swimming offers a vigorous workout and a fun way to pass a hot summer day. Many people even consider it a form of meditation, as the rhythm of stroking through the water for a while seems to lessen any problem you might have.

Evidence of recreational or survival swimming in prehistoric times has been found. Although the earliest evidence dating to Stone Age paintings from around 10,000 years ago, it's probably older than the record. Archaeological and other evidence shows swimming to have been practiced as early as 2500 BCE in Egypt (Love, 2007). The earliest physical evidence of swimming relates to

prehistoric drawings from the Stone Age at "the cave of swimmers" near Wadi Sura in the south western part of Egypt. Since then, records of swimming have also been recorded in Assyrian, Greek, and Roman civilizations. In particular, Greece and Rome swimming was a part of martial training and was, with the alphabet, also part of elementary education for males (Britannica, 2020). In the Orient swimming dates back at least to the 1st century BCE, there being some evidence of swimming races then in Japan. "Competitive swimming is at least as old as 36 B.C., when the Japanese held the first known swimming races."

In modern times, swimming emerged as a competitive recreational activity in the 1830s in England. In 1828, the first indoor swimming pool, St George's Baths was opened to the public. By 1837, the National Swimming Society was holding regular swimming competitions in six artificial swimming pools, built around London (International Journal of the History of Sport, 2007). Competitive swimming, most notably the modern Olympic Games, begun in Athens, Greece, in 1896 increased interest in strokes. They were: 100 m, 100 m for sailors, the 500 m and the 1200 m competitions. Scientific stroke analysis has helped produce more varied strokes, greater speeds, and a better understanding of propulsion through the water. Swimming is available to the general public and members at Life Leisure during publicized Public Swimming sessions (Smith et al., 2014).

In January 2020, a new coronavirus was identified in China and the COVID-19 pandemic, also known as the coronavirus pandemic, is an ongoing global pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Swimming in a pool or a lake, and sunbathing on the beach or shore, implies close proximity between individuals and high frequency of touching common surfaces. These factors would increase the risk of virus transmission (Yaacoub et al., 2021). Indeed, SARS-CoV-2 is reported to spread through droplet and potentially airborne transmission (Carraturo et al., 2020). Water-borne transmission is still not certain. Infected people are more likely to transmit COVID-19 when they are physically close. However, infection can occur over longer distances, particularly indoors such as swimming pools (Miller et al., 2021; Wang et al., 2021). All public swimming pools are required to be tested for their pH levels, disinfectant levels and go through a regular cleaning regime daily. Many countries around the world, including Korea, have caused many restrictions in the COVID-19 situation (WHO, 2020). The aim of this study is to survey an overview of perspectives and approaches to sports facilities focusing on swimming pools at Daegu Metropolitan City in Korea.

METHODOLOGY

Subjects

Daegu is a Metropolitan city and is located in south-eastern Korea about 80 km (50 mi) from the seacoast, near the Geumho River and its mainstream, Nakdong River in Gyeongsang-do. It is the third-largest urban agglomeration in Korea with over 2.5 million residents. Daegu is divided into 7 districts (Gu) and 1 county (Gun). Daegu sits in a basin surrounded by low mountains. Daegu has a warm temperate moist forest climate.

Clearly, the aquatic environment offers scope for aerobic activity, however the specific interaction between physiological and hydrodynamic effects of immersion are also of particular interest and are thought to confer additional effects/advantages (Chase et al., 2008b); Becker (2009). The provision of 16 large swimming pools in Daegu City is encouraging. Data from 2019 before COVID-19 and 2020 after COVID-19 were used for swimming in Dalseo-gu, Daegu.

Research limitations

Data were extracted using a review schema developed by the research team from South Korea's Ministry of Culture, Sports and Tourism (2020) and Daegu Metropolitan City (2021). The data gives insight into the use by adults.

RESULTS AND DISCUSSIONS

As of 2020, a total of 16 swimming pools were supplied to Daegu Metropolitan City, of which 8 were built in Dalseo-gu, 3 were built in Dalseong-gun, 2 were built in Seo-gu, and 1 were built in Dong-gu and Buk-gu, respectively (Table 1). More than one swimming pool was created in five of the eight districts and counties, but there were no swimming pools in Nam-gu, Suseong-gu, and Dong-gu.

Dalseo-gu had the largest number with 8 facilities. The status of swimming pool use in this Dalseo-gu was compared between 2019 before COVID-19 and 2020 after COVID-19.

Table 1. Status of establishment of swimming pools by districts or regions in Daegu Metropolitan City

Districts	Establishment	Management	Field
Dalseo-gu	Duryu Swimming Pool	Facility Management Corporation	Swimming, survival swimming, aquarobics, etc.
	Olympic Memorial Living Swimming Pool	Facility Management Corporation	
	Smile Face Pool	Private operation	
	Sungseo Ground Swimming Pool	Daegu Metropolitan City	
	Youth Training Center Swimming Pool	Mahayana Buddhist Culture	
	Labor General Welfare Center Swimming Pool	Korean Labor Society	
	Dalgubul Overall Sports Center Swimming Pool	Jinseonk Welfare Foundation	
	Daegu Student Culture Center Swimming Pool	Cham Hangbok Co.	
Dalseong-gun	Women Culture Center Swimming Pool	Dalseong-gun Facility Management Corporation	Swimming, survival swimming, aquarobics, etc.
	Dalseong Culture Center Swimming Pool	Dalseong-gun Facility Management Corporation	
	Seojae Culture and Sports Center Swimming Pool	Daegu Facilities Management Corporation	
Dong-gu	Women Culture Foundation Swimming Pool	Donggu Cultural Foundation	Swimming, survival swimming, aquarobics, etc.
	Ayang Art Center Swimming Pool	Donggu Cultural Foundation	
Buk-gu	Buk-gu Youth Center Swimming Pool	Buk-gu Youth Center Foundation	Swimming

Seo-gu	Seo-gu Youth Center Swimming Pool	The Together Heart Foundation	Survival swimming
	Pengri Sport Center Swimming Pool	Daegu City Education Office	

Data: Ministry of Culture, Sports and Tourism, National Public Sports Facility (2020).

According to the criteria for classification of public sports facilities, a total of public sports facilities were supplied to Daegu Metropolitan City out of 14,303 facility items as of 2019 (Table 2). The number of sports programs decreased significantly from the previous year to 5,584 in 2020. It was found that women participated more in swimming than men. In particular, disparities between physical activity levels in men and women are notable, with women being more likely to adopt sedentary behaviors (BHF, 2015). Swimming/aquatic and walking interventions are frequently advocated for older, sedentary women (ACSM, 2016). The study means that many of swimming people are staying at home. However, there is no evidence that the virus that causes COVID-19 can be spread to people through water in swimming pools (CDC, 2021).

Table 2. Utilization status by programs at Dalseo-gu

Year	Operating hours	Total	Men	Women	Non-disabled		Disabled	
					Men	Women	Men	Women
2019	06:00-22:00	14,303	3,917	10,386	3,877	10,320	40	66
2020	06:00-22:00	5,584	1,675	3,909	1,635	3,865	40	44

Duryu Swimming Pool is a facility that is frequently used by the disabled due to its good accessibility, and has swimming lessons, aquavics, and free swimming. In 2019, the number of swimming lessons at Duryu Swimming Pool was 167,478 for men and 222,841 for women (Table 3). In 2020, the number of swimming lessons decreased by 93.7% for men and 92.9% for women. In 2020, the numbers of swimming lessons and free swimming were decreased significant (p<0.001) (Table 6). The numbers of aquarobics were also decreased significant (p<0.01).

Table 3. Current status of use of Duryu Swimming Pool by year at Dalseo-gu

Year	Program	Total	Men	Women	Non-disabled		Disabled	
					Men	Women	Men	Women
2019	Swimming lesson	390,319	167,478	222,841	166,388	221,570	1,090	1,271
	Aquarobics	235,849	1,132	234,717	1,132	228,632	0	6,085
	Free swimming	228,967	108,792	120,175	108,247	119,540	545	635
2020	Swimming class at dawn	26,245	10,521	15,724	10,358	15,535	163	189
	Aquarobics	18,279	57	18,222	57	17,466	0	756
	Free swimming	62,815	25,030	37,785	24,949	37,422	81	363

The Daegu Olympic Stadium hosted football matches at the 1988 Summer Olympics (Seoul). The Olympic Memorial Living Swimming Pool is a facility to commemorate it. This swimming pool

is open almost all day. In 2019, the swimming pool had 1,475 male users and 2,788 female users (Table 4). In 2020, there were 1,125 male users and 2,045 female users. There was no significant difference between the two years.

Table 4. Utilization status of Olympic Memorial Living Swimming Pool at Dalseo-gu

Year	Operating hours	Total	Men	Women	Non-disabled		Disabled	
					Men	Women	Men	Women
2019	06:00-22:00	4,263	1,475	2,788	1,390	2,646	85	142
2020	06:00-22:00	3,170	1,125	2,045	1,035	1,916	90	129

The Youth Training Center Swimming Pool is a facility that students visit a lot on weekends or vacations. The swimming pool is operated by various time zones and can be used by adults on weekdays when there are no students. Swimming pools are used by a large variety of people, varying in age, health, and hygienic standards—not only to practice a sport, but also for recreational and educational use and rehabilitation therapy (Kamioka et al., 2010). Most women use the morning swimming class (Table 5). In 2019, disabled people rarely used it except for afternoon swimming classes and youth swimming classes. In 2020, disabled people used aqua classes and youth swimming classes.

Table 5. Current status of use of Youth Training Center Swimming Pool by year at Dalseo-gu

Year	Program	Grade	Total	Men	Women	Non-disabled		Disabled	
						Men	Women	Men	Women
2019	Swimming class at dawn	A	1,504	667	837	667	837	0	0
		B	1,326	486	840	486	840	0	0
		C	1,368	512	856	512	856	0	0
	Morning swimming classes	A	968	30	938	30	938	0	0
		B	1,663	0	1,663	0	1,663	0	0
		C	1,467	0	1,467	0	1,455	0	12
	Aqua (adult)	A	1,060	0	1,060	0	1,060	0	0
		B	350	17	333	17	333	0	0
	Afternoon swimming classes	A	77	31	46	31	0	0	46
		B	680	325	355	325	355	0	0
	Youth swimming classes	A	745	374	371	334	363	40	8
		B	827	371	456	371	456	0	0
	Evening swimming classes	A	992	457	535	457	535	0	0
		B	1,166	575	591	575	591	0	0
		C	110	72	38	72	38	0	0
2020	Swimming class at dawn	A	720	343	377	343	377	0	0
		B	631	255	376	255	378	0	0
		C	590	231	359	231	359	0	0
	Morning swimming classes	A	315	4	311	4	311	0	0
		B	683	0	683	0	683	0	0
		C	285	0	285	0	285	0	0
	Aqua (adult)	A	762	0	762	0	738	0	24

		B	14	0	14	0	14	0	0
	Afternoon swimming classes	A	9	8	1	8	1	0	0
		B	150	100	50	100	50	0	0
	Youth swimming classes	A	61	44	17	4	9	40	8
		B	424	175	249	175	249	0	0
	Afternoon swimming classes	A	414	202	212	202	200	0	12
		B	472	269	203	269	203	0	0
		C	54	44	10	44	10	0	0

A: Beginner, B: Intermediate, C: Advanced.

Most of the changes in the number of swimming participants before and after COVID-19 were significantly different (Table 6).

Swimming burns lots of calories, anywhere from 500-650 per hour depending on degree of efficiently strength. If men and women don't exercise such as swimming due to COVID-19, it can lead to obesity. While sports and leisure facilities such as fitness clubs, sports clubs, swimming pools, and community sports grounds were important to decrease the spread of COVID-19, several studies have shown that these restrictions negatively affected physical activity habits among the general adult population (Helsingen et al., 2020; Lopez-Bueno et al., 2020; Robinson et al., 2021). For instance, studies have shown that COVID-19 lockdown resulted in a decrease in all intensity levels of physical activity (vigorous, moderate, walking, and overall), lower compliance with the physical activity recommendations (from 81 to 62%), as well as a parallel increase in daily sitting time of 28% (from 5 to 8 h per day) (Ammar et al., 2020; Wilke et al., 2021; Gjestvang et al., 2022). Worldwide, overweight (Body Mass Index (BMI) ≥25) and obesity (BMI ≥ 30) are some of the largest public health challenges (Ekelund et al., 2015). In this era of COVID-19, exercise such as swimming, which consumes a lot of calories, is needed to prevent obesity.

Table 6. Validation of significance for swimming pool facility at swimming pools by year 2019 and 2020 at Dalseo-gu, Daegu Metropolitan City in Korea

Swimming pools	Item	Non-disabled	Disabled
Total	Program	4.062**	1.749*
Duryu	Swimming lesson	106.687***	301.768***
	Aquarobics	22.163**	1.888*
	Free swimming	241.626***	15.455*
Olympic Memorial	Swimming	78456.567***	0.034
Youth Training Center	Swimming class at dawn	12.829*	0
	Morning swimming classes	0.977	0
	Aqua (adult)	0.237	2.500*
	Afternoon swimming classes	1.693*	0.833
	Youth swimming classes	13.871*	0.536
	Evening swimming classes	1.984	0.522

*p<0.05, **p<0.01, ***p<0.001.

CONCLUSIONS

The numbers of swimming activity during the COVID-19 pandemic were significantly decreased and this could be vigorously negative effects at the public health level. The studies illustrate the need for opening swimming pool on civil health in physical activity.

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