ASSOCIATION OF WATER QUALITY AND USER PRACTICES ON HEALTH EFFECTS OF POOL USERS

Yong Shen Ooi[1], Mohmad Puad Ma'on[2*], Nur Azalina Suzianti Feisal[2], Murni Amirra Aminuddin[2], Sundara Rajan Mahalingam[2], Nur Faiza Abdul Razak[2] and Nursalfarina Abdul Samad[2]

[1] Unit Inspektorat, Pejabat Kesihatan Daerah Bandar Baharu, 09800 Serdang, Kedah.
[2]Department of Environmental Health, Faculty of Health Sciences, MAHSA University, Selangor, Malaysia

****Corresponding Author, Email:** mohmadpuad@mahsa.edu.my*

ABSTRACT

Swimming pool users are susceptible to infection by a diversity of disease-causing organisms. Pool users are at risk of getting diseases due to contaminated pool water as well as pool user practices. This study aimed to determine the association between public pool water quality and user practices with the health effects of pool users. Pool water samples were taken from public swimming pools in Alor Setar, for pool water quality investigation. A total of 59 pool users consisting of 39 male and 20 female respondents were interviewed about the practices and symptoms of utilising the swimming pool via questionnaire. Data were analysed using SPSS Version 23. The pool water showed a range of 0.24 mg L^{-1} to 1.46 mg L^{-1} of free chlorine, the pH level of 6.73 to 7.3, 0.22 NTU to 2.37 NTU of turbidity, the temperature of 26.1℃ to 30.0℃, 88.4 mg L^{-1} to 93.3 mg L^{-1} of total alkalinity, 29 mg L^{-1} to 65.5 mg L^{-1} of total dissolved solids and 8 mg L^{-1} to 32 mg L^{-1} of nitrate concentration and E-coli were showed absent. Upper respiratory tract symptoms were found between genders (P =0.021), consisting of 9 (23.1%) males and 11 (55%) females. Eye irritation and lacrimation are symptoms found among those who have used swimming goggles (16%) and without using Google (66.7%) (with P=0.004). This study showed that poor pool user practices have contributed to health effects. Public health strategies should be applied to improve public awareness of the safe utilisation of the recreational environment.

***Keywords:** Disease, Practices, Swimming pool, Water quality*

Introduction

Healthy swimming is important to ensure the well-being of the pool users without causing hazards to the users. Recreational water diseases like rashes, acute gastrointestinal illness, acute respiratory illness, conjunctivitis, athlete feet, and swimmer ears are commonly found in pool users. For example, in Malaysia, the Ministry of Health (2016) reported cases of acute gastroenteritis (AGE) and there has been confirmation of positive rotavirus infections, leading to Bukit Merah Lake Town Resort which has swimming pools. The swimming pool users are susceptible to infection by a diversity of disease-causing organisms like *Crytosporidium* sp., *Salmonella* sp., *Gardia* sp., *E.coli*, *leptospirosis* sp. and etc. via ingestion, inhalation and dermal contact (Nemery et al., 2002; Sa et al., 2013; Suppes et al., 2016). Pathogenic microorganism that is spread through recreational water, including pools, spa and hot tubs, and causes disease and contamination. Children, people with a weakened immune system, as well as long-hour swimmers are most at risk to be infected by these recreational water diseases (Weisel et al., 2009; Li et al., 2015). According to Galle et al., 2016, the pool condition is potentially bringing individuals at risk of various well-being dangers related to microbial and chemical sullying or suffocating and damage perils. Aside from physical hazards like injury and drowning, and the mentioned microbial hazards, the chemical hazards could be potentially putting the pool users at risk as well, if there is no proper pool management. Chlorination is essential to ensure effective disinfection of pool water.

However, the chlorine dosage, duration, water characteristics, environmental condition and application practice could directly affect the effectiveness of chlorination (Fakour et al., 2018; Daiber et al., 2016, Font-ribera, 2010). The bacteria-elimination properties of chlorine are very helpful. However, chlorine, additionally, can cause symptoms that can be irritating to the public, and conceivably also unsafe (Catto et al., 2012; Villanueva et al., 2015; Li et al., 2018). Chlorine has a particular smell that most thought of upsetting, and overpowering (Kanan et al., 2010; Kogevinas et al., 2010; Speht et al., 2012; Veldhoven et al., 2018). There is the "tingle factor" chlorine may cause particular skin types to wind up troublesome and chafed. The disinfectant hypochlorite particle makes numbers of textures blur immediately when not washed off following leaving the swimming pool (Water S.P., 2010; Yang et al., 2018). Another disinfectant, chlorine gas drifting above the pool would be also unsafe for pool water usage. Some of these disease-causing organisms can live and may even grow in pool water unless the pool water is disinfected effectively and efficiently in a continuous manner. Hence, water quality has to be monitored so as to prevent the spread of diseases to pool users, with effective chlorination.

Monitoring pool water quality is essential to ensure that the water that comes into contact with pool users is in a safe and pleasant condition. Thus, a good monitoring regime is able to prevent infections by contaminants, ensure the water is aesthetically acceptable, and prevent adverse health effects or significant discomfort to pool users that may be caused by the existence of chemical constituents or physical characteristics of the water (Saba et al., 2015). Pool water characteristics have to be monitored for its physical, chemical and biological parameters (Esinulo et al., 2016; Pools et al., 2017). The acceptable standard qualities for parameters are shown in the table below, following the Swimming Pool Water Quality Standard and Monitoring Guidelines (Ministry of Health, 2017). These standard qualities are applicable to treated pool waters. Specific consideration will be given to parameters that have immediate or close relationship with the disinfection procedure.

Table 1.0: Swimming Pool Water Quality Standard and Monitoring Guidelines (Ministry of Health, 2017)

Parameter	Unit	Suitable Standard Values
Free residual chlorine	mg/l	0.5 – 3.0
pH	-	7.0 – 7.8
Turbidity	NTU	≤ 5.0
Temperature	°C	21.2 – 32.2
Total Alkalinity	mg/l	80 – 200
Hardness	mg/l	75 – 250
Total Dissolved Solids	mg/l	≤ 1000
Cyanuric Acid	mg/l	≤ 50
Nitrate	mg/l	≤ 10
Escherichia coli (*E. coli*)	-	Absent in (per) 100 ml

Pool water quality is a major component to prevent the spread and infection of recreational diseases. Nevertheless, the pool user practice is important to protect themselves from infection as well as to prevent bringing the potential contaminants into the pools and infecting other users (Amodio et al., 2014; Napoli et al., 2014). According to WHO (2006), it is normal for a person to shower before swimming. Pre-swim showering will help to remove traces of sweat, urine, fecal matter, cosmetics, suntan oil and other potential water contaminants, eventually preventing water contamination and disease outbreak. Footbaths and showers are managing papillomavirus and foot contaminations are likewise practicable. Proper usage of footwear, swimming goggles, and swimming cap help to protect pool users from infection. Community and public education from facility administrators, local authorities, general wellbeing bodies, pool-based clubs, and sports bodies are playing important significant roles in pool user education. Unfortunately, there are swimming pools in Malaysia which is not emphasise the pool water quality. Some are not following the specifications outlined by the Ministry of Health Malaysia for disinfection practice. Pool users as well have less awareness of hygiene practices for healthy swimming. The present days as well showed more incidents of water-borne diseases have been reported in the health office. Therefore, in this study, the association between the water quality of swimming pools and the health effects of pool users on the health effects of pool users, are being determined. This study is important to serve as a reference for pool users and pool management on actions that could be taken, to ensure the prevention of recreational water diseases.

Methodology

The study was conducted at swimming pools in the Kedah Aquatic Training Centre and MBAS Swimming Pool Complex. Kedah Aquatic Training Centre is located in Jalan Gunung Keriang, Alor Setar. While MBAS Swimming Pool Complex is located in Jalan Stadium, Bandar Alor Setar. This is a cross-sectional study where samples of pool water were taken and measured while the health effects were obtained by distributing questionnaires at the same time to determine the relationships in between. Samples were taken at a depth of 50 – 300 mm and at a minimum distance of 500mm from the edge of the pool. All samples were collected during the period of average bathing load on the weekday. A sampling at multiple locations is necessary to determine the area of the lowest reading. Samples of the pool water were at a location furthest away from the inlet or from the point of disinfectant dosing whereby the flow velocity and disinfectant residual are generally lowest. Depending on the hydraulics of the pool system, the lowest flow velocity and the lowest disinfectant residual level will normally occur near the water outlet such as the skimmer box or scum gutter. The parameters of pH, temperature, free chlorine, turbidity, total alkalinity, total dissolved solids, nitrate concentration and *E.coli* using HACH colorimeter (DR900), HACH turbidity meter (2100P), HACH conductivity meter (HQ14d), eXact Micro 7+ photometer, Lutron pH meter and Colilert test. Equipment was calibrated before use to prevent biased results.

For the user practice survey, the respondents for this project are the population and visitors around Alor Setar. The number of visitors to both swimming pools can reach up to 100 during peak hours, especially during the weekend and school holidays. The sample of swimmers taken is regardless of the gender in the study location. The sample size was calculated in the following way (Krejcie et al., 1970):

$$\mathbf{s = (X\ NP - P) \div (d\ N - + X\ P - P)}$$

s = required sample size.
X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841).
N = the population size.
P = the population proportion (assumed to be .50 since this would provide the maximum sample size).
d = the degree of accuracy expressed as a proportion (.05).

The questionnaire comprises socio-demographic data, behaviours of pool users such as pre-swim showers, footbaths, footwear, swimming caps, and swimming goggles, as well as health effects and symptoms such as upper respiratory tract symptoms, eye, skin, ear, gastroenteritis, itchiness and injuries. All information and data obtained were processed into graphs, tables and charts for analyse with IBM Statistical Package for the Social Sciences (SPSS) version 23 for a hypothetical test.

Results

Water Quality and Its Relationship with Health Effects

Three sampling points for each swimming pool had been done for parameters such as free chlorine level, pH level, turbidity level, temperature, total alkalinity, total dissolved solids, nitrate concentration and presence of *E-coli*. Water samples had been analysed and shown in Table 2.0 and Figure 1.0 to Figure 3.0 below.

Table 2.0: Data Collection from Aquatic Centre and MBAS

Location	Free Chlorine(mg/l)	pH	Turbidity (NTU)	Temperature (°C)	Total Alkalinity(mg/l)	TDS (mg/l)	Nitrate (mg/l)	*E-coli*
Aquatic Centre A	1.03	7.10	0.22	26.4	89.5	29.0	8	0
Aquatic Centre B	1.25	7.28	0.72	26.1	90.9	29.2	9	0
Aquatic Centre C	1.46	7.30	0.66	26.2	88.4	29.4	9	0
MBAS A	0.24	6.76	2.37	29.6	92.9	64.6	14	0
MBAS B	0.52	6.73	1.05	29.4	92.6	65.5	32	0
MBAS C	0.51	6.74	1.21	30.0	93.3	63.3	16	0

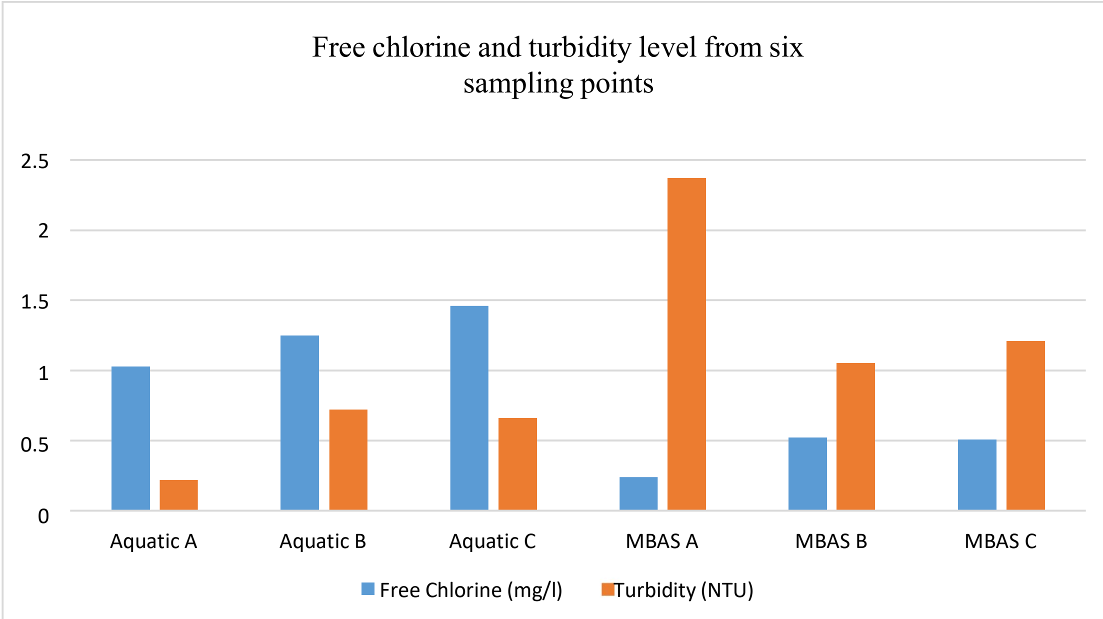

Figure 1.0: Free chlorine (mg L^{-1}) and turbidity level (NTU) for pool water samples

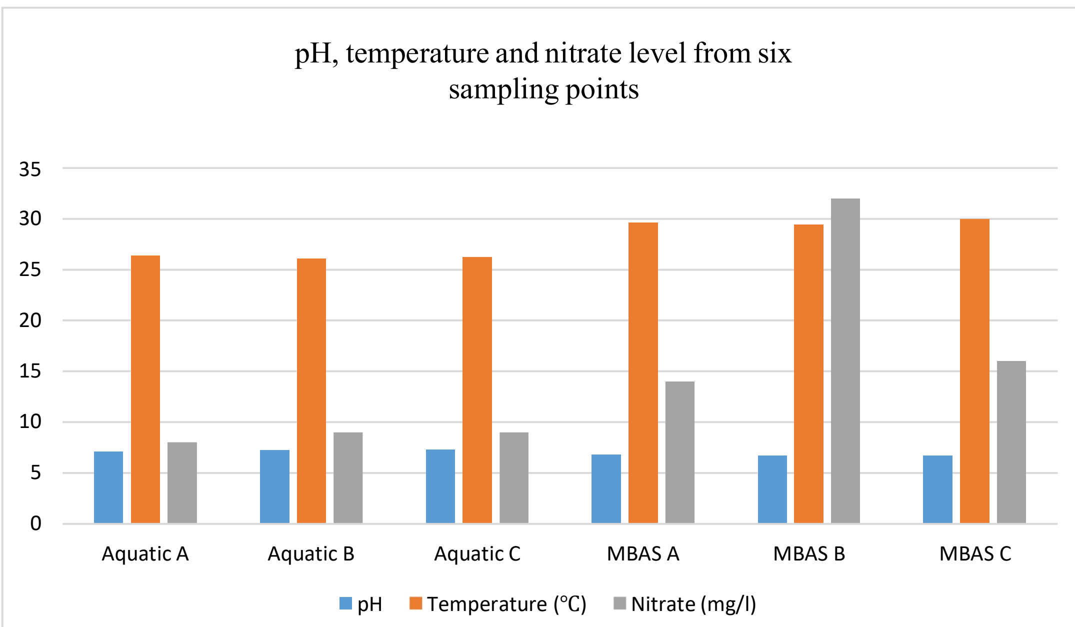

Figure 2.0: pH, temperature (°C) and nitrate concentration (mg L^{-1}) for pool water samples

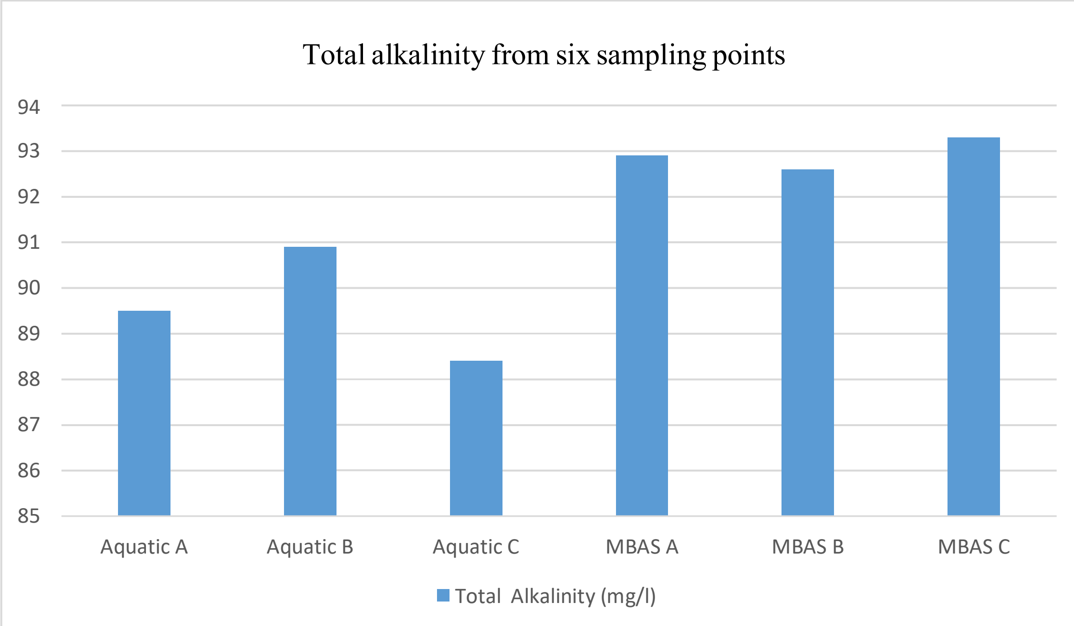

Figure 3.0: Total alkalinity concentration (mg L^{-1}) for pool water samples

Table 3.0: Independent T-Test of Physical and Chemical Parameter of Both Swimming Pools

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Free Chlorine	Equal variances assumed	.083	.787	5.334	4	.006	.82333	.15434	.39480	1.25186
	Equal variances not assumed			5.334	3.682	.007	.82333	.15434	.37981	1.26686
pH	Equal variances assumed	10.863	.030	7.528	4	.002	.48333	.06420	.30507	.66159
	Equal variances not assumed			7.528	2.077	.015	.48333	.06420	.21666	.75001
Turbidity	Equal variances assumed	4.851	.092	-2.271	4	.086	-1.01000	.44477	-2.24489	.22489
	Equal variances not assumed			-2.271	2.563	.123	-1.01000	.44477	-2.57233	.55233
Temperature	Equal variances assumed	1.538	.283	-17.410	4	.000	-3.4333	.1972	-3.9809	-2.8858
	Equal variances not assumed			-17.410	2.941	.000	-3.4333	.1972	-4.0681	-2.7986
Total Akalinity	Equal variances assumed	2.435	.194	-4.437	4	.011	-3.3333	.7513	-5.4193	-1.2474
	Equal variances not assumed			-4.437	2.312	.036	-3.3333	.7513	-6.1815	-.4851
TDS	Equal variances assumed	3.784	.124	-54.346	4	.000	-35.2667	.6489	-37.0684	-33.4649
	Equal variances not assumed			-54.346	2.131	.000	-35.2667	.6489	-37.9010	-32.6324
Nitrate	Equal variances assumed	12.921	.023	-2.103	4	.103	-12.000	5.706	-27.842	3.842
	Equal variances not assumed			-2.103	2.014	.169	-12.000	5.706	-36.391	12.391

An Independent T-test was used to test on physical and chemical parameters of both swimming pools. Free Chlorine tested ranged from 0.24 mg L^{-1} to 1.46 mg L^{-1} from all six sampling points. P-value showing 0.006, which is smaller than 0.05, therefore indicates that there is a statistical difference between the two sampling groups. The pH level recorded was 6.73 to 7.3. P=0.002,which is smaller than 0.05, indicates that there is a statistical difference between the two sampling groups. Turbidity level measured 0.22 NTU to 2.37 NTU from both swimming pools. Where the P-value showed 0.086, which is greater than 0.05, conclude that there is no statistical difference between the two sampling groups. Temperatures measured from pools were between 26.1℃ and 30.0℃. The P-value of Temperature is 0.000, which is smaller than 0.05, indicating that there is a statistical difference between the two sampling groups. Total alkalinity ranged from 88.4 mg L^{-1} to 93.3 mg L^{-1}. Whereas the P-value is 0.011, which is smaller than 0.05, indicating that there is a statistical difference between the two sampling groups. Total dissolved solids measured range from 29mg/l to65.5 mg L^{-1}. Where the P-value indicates 0.000, which is smaller than 0.05, showing that there is a statistical difference between the two sampling groups. Nitrate ranged from 8 mg L^{-1} to 32 mg L^{-1}. The P-value of the Nitrate level recorded is 0.103, which is greater than 0.05, indicating that there is no statistical difference between the two sampling groups.

The association between water quality and health effects was tested using the Chi-square test. It was found that no significant relationship between pool water quality with health effects. These results were attained even for non-compliance nitrate level of 32 mg L^{-1} in MBAS B, which was supposed to be $\leq$ 10 mg L^{-1}, following the Swimming Pool Water Quality Standard and Monitoring Guidelines (Ministry of Health, 2017). Based on Table 4.0, the p-value is 1.000, which is greater than 0.05, showing that there is no relationship between the nitrate level of pool water and the prevalence of respiratory symptoms. Based on Table 5.0, the p-value is 0.762, which is greater than 0.05, showing that there is no relationship between nitrate concentration in pool water and the prevalence of eye symptoms. Based on Table 6.0, the p-value is 0.725, which is greater than 0.05, showing that thereis no relationship between nitrate concentration in pool water and the prevalence of skin symptoms.

Table 4.0: Chi-Square Tests of nitrate concentration and respiratory symptoms.

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.013[a]	1	.909		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.013	1	.909		
Fisher's Exact Test				1.000	.564
Linear-by-Linear Association	.013	1	.909		
N of Valid Cases	59				

a. 0 cells (0.0%) have an expected count less than 5. The minimum expected count is 7.80.
b. Computed only for a 2x2 table

Table 5.0: Chi-Square Tests of nitrate concentration and eye symptoms.

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.116[a]	1	.734		
Continuity Correction[b]	.001	1	.979		
Likelihood Ratio	.115	1	.735		
Fisher's Exact Test				.762	.484
Linear-by-Linear Association	.114	1	.736		
N of Valid Cases	59				

a. 0 cells (0.0%) have an expected count less than 5. The minimum expected count is 5.46.
b. Computed only for a 2x2 table

Table 6.0: Chi-Square Tests of nitrate concentration and skin symptoms.

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.408[a]	1	.523		
Continuity Correction[b]	.080	1	.777		
Likelihood Ratio	.420	1	.517		
Fisher's Exact Test				.725	.396
Linear-by-Linear Association	.402	1	.526		
N of Valid Cases	59				

a. 1 cells (25.0%) have an expected count less than 5. The minimum expected count is 3.90.
b. Computed only for a 2x2 table

Demographic Data and Its Relationship with Health Effects

A normality test was done and data showed normal distribution. Hence, a parametrictest was done to conclude the association between demographic data and health effects. A Chi-square test was done between pool users' gender and health effects as below (Table 7.0):

Table 7.0: Gender and respiratory symptoms.

			RESPIRATORY		
			Yes	No	Total
GENDER	Male	Count	9	30	39
		Expected Count	13.2	25.8	39.0
	Female	Count	11	9	20
		Expected Count	6.8	13.2	20.0
Total		Count	20	39	59
		Expected Count	20.0	39.0	59.0

Table 8.0: Chi-Square Tests of gender and respiratory symptoms

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.013[a]	1	.014		
Continuity Correction[b]	4.672	1	.031		
Likelihood Ratio	5.901	1	.015		
Fisher's Exact Test				.021	.016
Linear-by-Linear Association	5.911	1	.015		
N of Valid Cases	59				

a. 0 cells (0.0%) have an expected count less than 5. The minimum expected count is 6.78.
b. Computed only for a 2x2 table

Based on Table 8.0, the P-value is 0.021, which is smaller than 0.05, showing that there is a relationship between genders and the prevalence of respiratory symptoms after swimming. 9 (23.1%) male pool users had respiratory symptoms, whereas 11 (55%) offemale pool users had respiratory symptoms.

Pool Users' Practices and Its Relationship with Health Effects

Pool users' practices were surveyed and the Chi-square test was used to determine the relationship with the health effects. Practice such as having a pre-swim shower, footbath, using proper footwear, swimming cap, swimming goggles, consumption of food and attendance per week were asked in the questionnaire. It was found that there is no relationship between wearing swimming goggles and the prevalence of respiratory symptoms and skin diseases after swimming. There is a significant relationship only between swimming goggles and eye symptoms.

Table 11.0: Usage of swimming goggles and eye symptoms crosstab

			EYE		
			Yes	No	Total
GOGGLES	Yes	Count	8	42	50
		Expected Count	11.9	38.1	50.0
	No	Count	6	3	9
		Expected Count	2.1	6.9	9.0
Total		Count	14	45	59
		Expected Count	14.0	45.0	59.0

Table 12.0: Chi-Square Tests of usage of swimming goggles and eye symptoms

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.819[a]	1	.001		
Continuity Correction[b]	8.200	1	.004		
Likelihood Ratio	9.232	1	.002		
Fisher's Exact Test				.004	.004
Linear-by-Linear Association	10.635	1	.001		
N of Valid Cases	59				

a. 1 cells (25.0%) have an expected count less than 5. The minimum expected count is 2.14.
b. Computed only for a 2x2 table

Based on Table 12.0, the p-value is 0.004, which is smaller than 0.05, showing that there is a relationship between wearing swimming goggles and the prevalence of eye symptoms after swimming. 8 (16%) that wore swimming goggles had eye symptoms, whereas 6 (66.7%) that did not wear swimming goggles had eye symptoms.

Discussion

In this study, almost all parameters tested were within the acceptable limit following the Swimming Pool Water Quality Standard and Monitoring Guidelines (Ministry of Health, 2017), except for nitrate concentration in one of the swimming pools that was shown did not comply with the standard. Improper management could be normally found in pools and especially in some particular groups. Public health strategies should be applied to improve public awareness and informationon the safe utilisation of the recreational environment. Problems such as salty taste in water may be caused by the high level of total dissolved solids and/or high level of chlorine. It can be treated by checking regularly and reduced by dilution. Cloudy water might also be detected when the pH and alkalinity level is great. Control measures must be taken to adjust the pH and alkalinity. Eyes and skin irritation were mentioned by the pool users where the pool water has issues such as its pH level and chlorine level. A combined residual chlorine level that is higher than 50% of free chlorine due to too much ammonia in the water would cause such effects.

Therefore, it is important to check and adjust the chlorine dose to meet its requirements. For microbiological analysis, there was no E-coli found in all six samples taken, therefore it could be concluded that adequate disinfectant concentration and management of the pools were satisfactory. Despite this, regular monitoring is still required to ensure free disinfectant residual chlorine concentration is adequate. The chemical necessary for pH modification is depending on whether the disinfectant used itself is alkaline or acidic. Alkaline disinfectants usually needed the addition of acid for pH correction. Acidic disinfectants usually needed the addition ofan alkali, commonly a mixture of sodium carbonate. MBAS swimming pool showed a lower pH level compared to the Aquatic Training Centre. Therefore, it needed to raise the pH level by adding chemicals such as sodium carbonate or soda ssh.

It is good practice and recommended for pool operators to run routine tests for self-checking and self-monitoring to make sure the pool water is safe to use at all times.The parameters and its test frequencies such as temperature, pH level and free residual chlorine should remain checked daily. *E-coli*, turbidity, nitrate and cyanuric acid to be tested every month. Total alkalinity, hardness and total dissolved solids should be testedat least once every three months.

The social demographic data showed a significant relationship between pool users' gender and the prevalence of health effects. Based on Table 3.2.2, the P-value is 0.021, which is smaller than 0.05, showing that there is a relationship between genders and the prevalence of upper respiratory tract symptoms after swimming. 9 (23.1%) male pool users had the symptoms such as sore throat and runny nose, whereas 11 (55%) female pool users had the symptoms. Additionally, the study showed no significant relationship between water quality with the health effects of pool users. Table 3.1.2 showed the water parameter tested ($P>0.05$) and the health effects on pool users. Therefore, the water quality of the swimming pools had no relationship with the health effects complained about by the pool users. The project also studied the relationship between pool users' practice in swimming pools and the prevalence of health effects. Based on Table 3.3.2, the P-value is 0.004, which is smaller than 0.05, showing that there is a relationship between wearing swimming goggles and the prevalence of eye symptoms after swimming. 8 (16%) that wore swimming goggles had eye symptoms such as irritation and lacrimation, whereas 6 (66.7%) that did not wear swimming goggles had eye symptoms.

Conclusion

Appropriate behaviours of pool users are identified with their consciousness of human health. Consideration ought to be given to health education in a swimming environment. As suggested by the WHO, all related department should play their roles in limiting unhealthy practices and guaranteeing pool security. The arrangement of non-exclusive data and the presentation of guidelines are insufficient to change practices. Instructive intercessions should expect to expand the learning and attention to health risks and the awareness that pool users are legitimately in charge of their own prosperity by rehearsing great cleanliness. Key roles should be played by swimming pool operators in technical skills as well as in educational and preventive viewpoints. The degree to which pools and comparative situations are regulated differently.Some required licenses by local authorities to operate. Local authorities may require an authorised designer to present the underlying designs for the development of another pool. The structure and development designs at that point must be checked on and endorsed. Intermittent reviews might be required to guarantee proceeded with consistence. Guidelines ought to accommodate the position to close the facility if any hazards and breaking of guidelines or a significant hazard to public health are identified,with reviving precluded until the issue has been rectified and measures are set up to forestall a repeat.

Swimming pools present no infection risks if their treatment systems are managed properly. Regular testing of pool water is, however, essential to ensure effective water treatment and is the only satisfactory way of determining rapidly whether disinfection is adequate and the water is balanced. Thus, it is required to ensurethe swimming pools are safe to be used and able to avoid any health effects on pool users. The pool operator has to ensure that pool users take a shower before entering the pool. It is because showering will evacuate hints of perspiration, pee, faecal issue, beautifyingagents, suntan oil and other potential water contaminants. Therefore, when pool users do so, the pool water will be cleaner, simpler to purify by just utilising a limited quantityof synthetic concoctions, and therefore even pleasant to swim in. Shower water must notrun to waste as well.

Besides that, it is important that no pool user should swim if he or she might have had diarrhoea recently. Parents are encouraged to ensure their youngsters utilise the latrine before they swim, and children and babies that have not been prepared ought to wear waterproof nappies or uncommonly planned bather wear. Little youngsters should at whatever point conceivable be bound to pools little enough to deplete in caseof an unplanned arrival of faecal or regurgitation. Swimming pool attendants must also be responsible to look out for cases of unintentional faecal release or vomit occurrencesto make sure the pool is clean to use at all times.

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