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Comparison of Biological Factors and Safety Culture Perception Level of Hospital Cleaning Staff

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ABSTRACT

Objective: The aim of this research is to identify the degree to which cleaning staff in public hospitals have adopted work health and safety activities and safety culture perceptions and converted these to behavior. **Materials and Methods:** The population for the research comprised 565 cleaning staff employed in a total of 12 secondary health institutions and tertiary health institutions linked to the union of public hospitals located in Giresun provincial center and counties. Data in the study were collected with a survey form including questions about sociodemographic features, working conditions, and knowledge, attitudes and behavior about biological factors and the Safety Culture Scale. **Results:** According to participant knowledge about biological factors causing infectious disease, only the fatalism subscale among safety culture perception levels was significant ($p<0.05$). For the relationship between participant behavior related to biological factors and safety culture, all dimensions of safety culture and the safety culture general variable were identified to significantly differ ($p<0.05$). **Conclusion:** To ensure safety in working environments, management attitude and behavior was determined to affect employees. Additionally, a statistically significant correlation was identified between occupational practices involving risky behavior and the fatalism variable. It appears the fatalistic approach may increase the risk of work accidents.
Keywords: Occupational Health, Safety, Culture.

Hastane Temizlik Personelinin Biyolojik Faktörler ile Güvenlik Kültürü Algı Düzeyinin Karşılaştırılması

ÖZ

Amaç: Bu araştırmanın amacı iş sağlığı ve güvenliği faaliyetleri ile güvenlik kültürü algısının kamu hastanelerinde çalışanlar temizlik personeli açısından ne ölçüde benimsendiği ve davranışa dönüştürüldüğünü belirlemektir. **Gereç ve Yöntem:** Araştırmanın evrenini Giresun ili merkez ve ilçelerinde bulunan kamu hastaneler birliğine bağlı toplam 12 adet İkinci Basamak Sağlık Kurumları ve Üçüncü Basamak Sağlık Kurumlarında çalışmakta olan 565 temizlik personeli oluşturmaktadır. Çalışmada veriler sosyodemografik özellikler ve çalışma koşullarına yönelik sorular ile biyolojik etkenlere yönelik bilgi, tutum ve davranışları içeren soruların yer aldığı anket formu ile Güvenlik Kültürü Ölçeği kullanılarak toplanmıştır. **Bulgular:** Katılımcıların bulaşıcı hastalığa neden olan biyolojik etkenler hakkındaki bilgi durumlarına göre güvenlik kültürü algı düzeyleri arasında sadece Kadercilik alt boyutunun anlamlı olduğu bulunmuştur ($p<0.05$). Biyolojik etkenlere yönelik katılımcılar tarafından gerçekleştirilen davranışlar ile güvenlik kültürü arasındaki ilişki ise güvenlik kültürü tüm boyutları ve Güvenlik Kültürü Genel değişkeninde anlamlı olarak farklılaştığı tespit edilmiştir ($p<0.05$). **Sonuç:** Çalışma ortamlarında güvenliğin sağlanmasında yönetimin tutum ve davranışının çalışanlar üzerinde etkili olduğu belirlenmiştir. Ayrıca riskli davranışlar içeren mesleki uygulamalar ile kadercilik değişkeni arasında istatistiksel olarak anlamlı ilişki tespit edilmiş, kaderci yaklaşımın iş kazası riskini artırabileceği görülmüştür.
Anahtar Kelimeler: İş Sağlığı, Güvenlik, Kültür.

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INTRODUCTION

The work health and safety (WHS) concept, aiming to improve working conditions for laborers, began with industrialization in the 'Industrial Revolution.' Over time the WHS concept developed in line with a multidisciplinary perspective to become the independent branch of science it is today, targeting safer and healthier working environments for employees in light of scientific data (Çavuş and Keskin, 2020).

The most important ratios showing the presence of a safe environment in the workplace are the 'accident frequency' and 'accident severity' rates determined by the ILO (Nişancı and Demirören, 2020). Currently, behavior that is routine in the work environment and is not possible to change in a short duration is shown to be the main cause of work accidents (Çögenli and Özer, 2017). The most important reason for this is the lack of an active positive safety culture in workplaces at present (Nişancı and Demirören, 2020).

The safety culture concept is stated to be the system of values reflecting the attitudes and beliefs of employees while also summarizing the beliefs and values of employees in the workplace (Correll and Andrewartha, 2000; Tutar et al., 2019). Safety culture is a subcomponent of institutional culture, defined by the personal, occupational and institutional features related to safety (Cooper, 2002). At the same time, safety culture ensures definition of attitude, values, perception and behavior of people and groups when determining the form of management related to WHS (Uçkun et al., 2013). Thus, it ensures the determination of the common beliefs and ideas of the employees about the dangers and possible risks that may cause all kinds of accidents and injuries (Karaman and Eravcı, 2021).

The variety of institutions in the health sector are workplaces offering health services (WHO, 2021). Based on national census counts, statistical sources and current analyses, the World Health Organization estimates there are a total of 59.8 million health employees around the world (ICOH, 2021). Hospitals are one of the work environments providing health services and involve significant risks in the work environment in terms of WHS. According to the National Institute for Occupational Safety and Health (NIOSH), hospitals have 29 types of physical, 25 types of chemical, 24 types of biological, 6 types of ergonomic and 10 types of psychosocial hazard and risk factors (Yıldız, 2020). For health employees, the most important risk factor encountered in the daily work environment is biological factors (Bilir, 2016; Kurt et al., 2015).

The aim of this study is to the question the interaction of behavioral approaches to work safety with safety culture by comparing the knowledge, attitudes and behavior of hospital cleaning employees about working conditions and biological factors with the safety culture of employees.

The hypotheses of the research are as follows;

H_1: Participant safety culture levels (on the basis of subdimensions) will differ according to knowledge about biological factors causing infectious diseases.

H_2: Participant safety culture levels (on the basis of subdimensions) will differ according to statements about whether medical waste bags should be emptied into a new bag if leaking.

H_3: Participant safety culture levels (on the basis of subdimensions) will differ according to knowledge about whether medical waste bags should be squeezed to take up less space.

H_4: Participant safety culture levels (on the basis of subdimensions) will differ according to knowledge about identifying the hospital respiratory isolation precaution figure.

H_5: Participant safety culture levels (on the basis of subdimensions) will differ according to knowledge about identifying the hospital droplet isolation precaution figure.

H_6: Participant safety culture level (on the basis of subdimensions) will differ according to perceptions of transmitting infectious disease at work.

H_7: Participant safety culture levels (on the basis of subdimensions) will differ according to knowledge of how infectious diseases could be transmitted to them.

H_8: Participant safety culture levels (on the basis of subdimensions) will differ according to thoughts about whether personal protective equipment protects them sufficiently.

H_9: Participant safety culture levels (on the basis of subdimensions) will differ according thoughts about using personal protective equipment appropriate for purpose.

H_{10}: Participant safety culture levels (on the basis of subdimensions) will differ according to status related to injury by sharps (cutting tools) in the workplace.

H_{11}: Participant safety culture levels (on the basis of subdimensions) will differ according to status of use of personal protective equipment during injury.

H_{12}: Participant safety culture levels (on the basis of subdimensions) will differ according to status of notifying the Hospital Infection Control Unit of injury.

MATERIALS AND METHODS

The research was completed in health institutions including cleaning personnel who are at high risk in terms of exposure to medical wastes.

Research type, location and time

This research, performed with descriptive pattern, was completed from 01 June to 30 August 2021 in a total of 12 pieces secondary health institutions and tertiary health institutions in the public hospital union located in Giresun provincial center and counties.

Population and sample

The population for the study comprised cleaning staff. In the study, completed in a total of 12 health institutions included within the scope of the research, sample selection was not performed. A count was

performed including all cleaning staff in the sample employed in the institutions during the determined dates and voluntarily accepting participation in the research (N=565). In line with feedback and fully completed forms during the study dates, our study included 519 people out of 565 and 91.85% of the targeted population was reached.

Data collection tools and procedure

Data in the research were collected using a survey form prepared by the researcher and the Safety Culture Scale. The first section of the survey included questions about sociodemographic features and study conditions, while the second section included questions about knowledge, attitude and behavior about biological factors. The other data collection tool used in the research was the Safety Culture Scale comprising eight subscales to assess work safety created by Dursun (2011). The scale has 5-point Likert type and comprises 41 items (Dursun, 2011). Büyüköztürk (2010) reported that by examining factor loads, variables can be collected in factors and may be renamed linked to the conceptual basis according to the researcher's opinion. Within this scope, the 1st factor comprised items related to management commitment, safety priorities and safety communication and was called "management commitment and safety." The 2nd factor comprised items about safety education, safety awareness and competence, and employee engagement and was called "safety training, safety awareness and competence and employee engagement." The 3rd factor comprised items about fatalism and was called "fatalism." In line with this, the Cronbach alpha coefficients were 0.96 for the first dimension, 0.91 for the second dimension, 0.90 for the third dimension and 0.95 for the scale in general. For all dimensions, the reliability coefficients were greater than 0.70, so scale reliability was proven.

Data analysis

In the study, the Statistical Package for the Social Sciences (SPSS 21) program was used. The descriptive statistics are presented for the study population and factor analysis was used for subdimensions belonging to safety culture levels. An independent t-test was used to test hypotheses within the framework of knowledge, attitude and behavior about biological factors. Before the parametric analyses, the normality assumption was checked by Kolmogorov-Smirnov and other empirical and graphical methods.

Ethical considerations

The research was permitted by ethical committee decision dated 14/04/2021 and numbered 2021/03 from Gümüşhane University Scientific Research and Publication Ethics Committee. To use the scale in the research, necessary permission was obtained from the scale owner. Before beginning collection of research data, with the aim of protecting participant rights, and in line with the principle of autonomy, employees were told they could withdraw from the study and signed an 'informed consent form.'

RESULTS

The descriptive features, like age, gender and educational status, of staff assessed within the scope of the study, along with professional descriptive questions like professional seniority and weekly working hours, and findings about frequency and percentage distributions for work health and safety practices are shown in Table 1.

Table 1. Frequency distributions regarding the demographic characteristics of the participants.

Demographics		n	%
Gender(n=504)	Male	208	41.0
	Female	296	59.0
Age (n=513)	18-24	55	10.7
	25-29	71	13.7
	30-34	84	16.2
	35-39	77	14.8
	40-44	102	19.7
	45-49	83	16.2
	50-54	28	5.5
	55-59	11	2.1
	60-64	2	0.4
Educational status (n=518)	Primaryschool	124	23.9
	Middle school	101	19.5
	High school	220	42.5
	University	73	14.1
Seniority (n=516)	Less than a year	8	1.6
	Between 1-3 years	186	36.0
	Between 3-5 years	64	12.4
	Between 5-10 years	102	19.8
	For over 10 years	156	30.2
Way of working (n=516)	Day shifts	156	30.0
	Night shifts	256	49.6
	Day and night shifts	105	20.3
Weekly working hours (n=511)	Less than 45 hours	34	6.7
	Between 45-48 hours	442	86.5
	Between 49-52 hours	22	4.3
	53 hours or over	13	2.3
Occupational health training (n=511)	Yes	491	96.1
	No	20	3.9
Injuryexperience (n=511)	Yes	134	25.8
	No	377	72.6

The findings related to hypotheses H_1, H_2, H_3, H_4 and H_5 about the interaction between the safety culture of participants with knowledge about biological factors are presented in Table 2.

When Table 2 is investigated, according to participant knowledge about biological factors causing infectious diseases, safety culture perception levels were only significant for the fatalism subdimension for the H_1, (Factor 3; $t=-2.914$, $p<0.05$), H_2 (Factor 3; $t=2.207$, $p<0.05$), and H_3 (Factor 3; $t=2.500$, $p<0.05$) hypotheses. For H_4 (Factor 3; $t=2.621$, $p<0.05$, General; $t=3.112$, $p<0.05$) and H_5 (Factor 3; $t=3.232$, $p<0.05$, General; $t=3.663$, $p<0.01$), the safety culture dimensions of management commitment and safety and general safety culture variables were significant.

The interaction between safety culture and attitudes developed by participants about biological factors was tested with hypotheses H_6, H_7, H_8 and H_9. In the study, hypotheses H_6, H_7 and H_9 were rejected, while H_8 was accepted.

Apart from the fatalism dimension, for the other subdimensions and general safety culture variable, hypothesis H_8 (Factor 1; t=2.895, p<0.05, Factor 2; t=2.775, p<0.05, General; t=2.757, p<0.05) was identified to display a statistically significant difference (Table 3).

The relationship between behavior of participants about biological factors and safety culture was tested with hypotheses H_{10}, H_{11} and H_{12}. In the study, hypotheses H_{10} and H_{11} were not accepted. For the accepted hypothesis H_{12} (Factor 1; t=4.626, p<0.001, Factor 2; t=3.739, p<0.001, Factor 3; t=2.193, p<0.05, General; t=5.657, p<0.001), all dimensions of safety culture and general safety culture variables were identified to significantly differ (Table 4).

Table 2. Comparison of the knowledge level of the participants about biological factors and the level of safety culture.

Dimension	Hypothesis tests	n	x̄	SS	t	p
	H_1					
Factor 1	Informed	149	2.71	1.09	0.676	0.500
	Uninformed	256	3.02	0.93		
Factor 2	Informed	148	3.49	1.00	-1.428	0.155
	Uninformed	262	3.63	0.76		
Factor 3	Informed	149	2.71	1.09	-2.914	**0.004***
	Uninformed	256	3.02	0.93		
General	Informed	134	3.36	0.84	-0.151	0.880
	Uninformed	211	3.38	0.65		
	H_2					
Factor 1	True	149	3.38	0.90	-1.633	0.103
	Wrong	283	3.52	0.85		
Factor 2	True	161	3.65	0.83	1.032	0.303
	Wrong	300	3.57	0.83		
Factor 3	True	159	3.08	1.07	2.207	**0.028***
	Wrong	300	2.86	0.98		
General	True	130	3.40	0.74	0.156	0.876
	Wrong	260	3.39	0.73		
	H_3					
Factor 1	True	23	3.50	0.77	0.211	0.833
	Wrong	409	3.47	0.88		
Factor 2	True	25	3.62	0.87	0.213	0.831
	Wrong	435	3.59	0.84		
Factor 3	True	25	3.42	0.87	2.500	**0.013***
	Wrong	435	2.90	1.02		
General	True	21	3.50	0.70	0.765	0.445
	Wrong	368	3.38	0.74		
	H_4					
Factor 1	True	372	3.54	0.82	2.621	**0.009***
	Wrong	12	2.91	0.84		
Factor 2	True	396	3.65	0.76	0.534	0.601
	Wrong	16	3.49	1.15		
Factor 3	True	396	2.90	0.99	0.263	0.793
	Wrong	16	2.83	1.13		
General	True	335	3.43	0.68	3.112	**0.002***
	Wrong	10	2.75	0.78		

* p<0.05, ** p<0.001

Table 2 (Continue) Comparison of the knowledge level of the participants about biological factors and the level of safety culture.

Dimension	Hypothesis tests	n	x̄	SS	t	p
	H_5					
Factor 1	True	365	3.55	0.82		
	Wrong	17	2.89	0.77	3.232	**0.001***
Factor 2	True	386	3.66	0.76		
	Wrong	22	3.34	1.00	1.468	0.156
Factor 3	True	385	2.91	1.00		
	Wrong	24	2.85	0.97	0.247	0.805
General	True	328	3.44	0.68		
	Wrong	16	2.81	0.70	3.663	**0.000****

* p<0.05, ** p<0.001

Table 3. Comparison of the participants' attitudes towards biological factors and the level of safety culture.

Dimension	Hypothesis tests	n	x̄	SS	t	p
	H_6					
Factor 1	Yes	383	3.44	0.88		
	No	29	3.57	0.87	-0.716	0.475
Factor 2	Yes	401	3.56	0.85		
	No	33	3.79	0.65	-1.483	0.139
Factor 3	Yes	398	2.89	1.02		
	No	37	2.88	0.91	0.074	0.941
General	Yes	339	3.35	0.75		
	No	30	3.47	0.56	-1.073	0.290
	H_7					
Factor 1	Yes	294	3.46	0.88		
	No	105	3.42	0.89	0.468	0.640
Factor 2	Yes	308	3.58	0.84		
	No	114	3.59	0.91	-0.087	0.930
Factor 3	Yes	304	2.86	1.00		
	No	119	3.05	1.05	-1.766	0.078
General	Yes	262	3.36	0.73		
	No	94	3.38	0.78	-0.183	0.855
	H_8					
Factor 1	Yes	361	3.52	0.86		
	No	66	3.19	0.88	2.895	**0.004***
Factor 2	Yes	381	3.65	0.80		
	No	69	3.30	0.97	2.775	**0.007***
Factor 3	Yes	383	2.94	1.01		
	No	68	2.78	1.09	1.143	0.254
General	Yes	326	3.44	0.70		
	No	58	3.11	0.85	2.757	**0.007***
	H_9					
Factor 1	Yes	405	3.46	0.86		
	No	19	3.65	0.80	-0.903	0.367
Factor 2	Yes	429	3.60	0.83		
	No	19	3.54	0.92	0.313	0.755
Factor 3	Yes	429	2.91	1.02		
	No	20	3.17	1.14	-1.094	0.274
General	Yes	364	3.38	0.73		
	No	18	3.59	0.69	-1.215	0.225

* p<0.05

Table 4. Comparison of the participants' behaviors towards biological factors and the level of safety culture.

Dimension	Hypothesis tests	n	x̄	SS	t	p
	H_{10}					
Factor 1	Yes	112	3.43	0.84	-0.521	0.603
	No	324	3.48	0.89		
Factor 2	Yes	125	3.53	0.82	-1.151	0.250
	No	337	3.63	0.84		
Factor 3	Yes	119	2.97	1.00	0.472	0.637
	No	344	2.91	1.03		
General	Yes	103	3.35	0.73	-0.524	0.601
	No	289	3.39	0.77		
	H_{11}					
Factor 1	Yes	92	3.41	0.84	-0.334	0.739
	No	12	3.50	0.94		
Factor 2	Yes	103	3.51	0.82	0.091	0.928
	No	13	3.48	1.07		
Factor 3	Yes	101	2.95	0.95	-0.156	0.876
	No	11	3.00	1.35		
General	Yes	87	3.33	0.70	-0.228	0.820
	No	10	3.39	1.03		
	H_{12}					
Factor 1	Yes	73	3.66	0.76	4.626	**0.000****
	No	24	2.81	0.83		
Factor 2	Yes	79	3.71	0.77	3.739	**0.000****
	No	28	3.05	0.86		
Factor 3	Yes	76	3.07	0.95	2.193	**0.031***
	No	28	2.60	1.06		
General	Yes	67	3.57	0.62	5.657	**0.000****
	No	23	2.70	0.69		

* p< 0.05, ** p< 0.001

DISCUSSION

The relationship between safety culture perception levels and knowledge, attitude and behavior about biological factors of hospital cleaning staff were investigated. In the study, statistical analyses in line with the hypotheses are interpreted in comparison with similar studies in the literature.

In the study, H_1 hypothesis observed that the safety culture dimension of fatalism significantly differed ($p<0.05$). Participants without adequate knowledge about biological factors were identified to have statistically significantly higher points for the fatalism subdimension compared to participants with Knowledge. In line with these results, H_1 hypothesis was accepted.

For the H_2 hypothesis in the study, the fatalism subdimension of safety culture appeared to significantly differ ($p<0.05$). Participants answering the statement 'leaking bags should be emptied into a new bag' wrongly were found to have higher fatalism subdimension points compared to those answering the question correctly and H_2 hypothesis was accepted.

Statistically significant differences were observed between the knowledge of participants about the statement 'medical waste bags should be squeezed to take up less space' and the safety culture dimensions. This situation was due to the fatalism subdimension ($p<0.05$). In line with this, the H_3 hypothesis of the study was accepted. In a study about organizational culture and work safety and employee health culture, Güven (2014) stated that most employees had a traditional fatalist understanding due to social culture (Güven, 2014). Aytaç et al. (2017) reported that as safety culture perception levels reduced, fatalism perceptions increased in a study of female laborers working in the metal industry (Aytaç et al., 2017). Dursun (2011) stated that fatalist approaches by employees reduced safety participation and in line with this, employees implemented safety behavior related to work safety less (Dursun, 2011). In line with this literature information, our study similarly observed that the fatalism perception affected the safety culture in businesses.

In our study, a statistically significant difference was identified between participant knowledge about identifying the hospital respiratory and droplet isolation precaution figures with safety culture levels ($p<0.05$). Employees correctly identifying the hospital respiratory and droplet isolation precaution figures were observed to have higher points for management commitment and safety and general safety culture compared to those who could not identify the figures. In line with this result, hypotheses H_4 and H_5 were accepted. Claudia stated

that management culture was an inseparable part of institutional culture in research about the importance of institutional management for institutional culture (Claudia, 2016). A study of a construction company by Kim et al. (2019) reported that safety management systems had positive impact on safety performance (Kim et al., 2019). These results are similar to our study, and show that management is effective on employee behavior and formation of the safety culture perceptions of employees.

When participant perceptions about transmission of infectious diseases in the workplace and how infectious diseases could be transmitted to them are compared according to safety culture levels, no statistically significant difference was observed ($p>0.05$). In line with this, hypotheses H_6 and H_7 were rejected. When assessed from a holistic perspective, employees are expected to perceive individual safety as a value. Participants in our study had inadequate attitudes about infectious diseases causing a risk to them, while it appeared they did not perceive individual safety as a value.

When safety culture levels are compared according to whether participants thought personal protective equipment protected them sufficiently, apart from fatalism, all subdimensions were identified to display significant differences ($p<0.05$). In line with the present statistical analyses, hypothesis H_8 was accepted. It appears that fatalism perceptions were not effective on behavioral approaches about the use of personal protective equipment by participants, and that they had the safety culture perception as desired in terms of use of personal protective equipment against risks and hazards.

It was identified that the safety culture levels of participants did not differ according to thoughts about use of personal protective equipment appropriate for purpose ($p>0.05$). In this situation, hypothesis H_9 was not accepted. Employees used personal protective equipment in their working areas; however, it is thought they do not have adequate knowledge levels about the degree to which they use it appropriate for purpose.

Participants not injured by sharps had higher general safety culture perception levels and mean points for all subdimensions apart from fatalism, compared to those who were injured. However, the differences did not reach statistical significance ($p>0.05$). Hypothesis H_{10} was not accepted. When national and international publications are investigated, similarly, it was reported that no significant differences were found between employees experiencing work accidents in the workplace or not and safety culture levels (Akdeniz, 2018; Çiçek, 2016; Gürbüz and İbrakovic, 2017; Kao et al., 2008). When the findings of our study are compared with similar studies in the literature, within the framework of safety culture, it is considered that the safety instructions conveyed to employees by the organizational structures are not effective at the desired level in order to protect employees from work accidents.

In the study, hypothesis H_{11} was rejected. In other words, the safety culture levels of participants appeared not to significantly differ ($p>0.05$) according to their use of personal protective equipment during injuries. Kaya and Arık (2017) reported that 8.3% of cleaning and patient care personnel working in hospitals did not use personal protective equipment during injury; however, they did not make any comparison related to safety culture perception (Kaya and Arık, 2017).

It appeared that all dimensions of safety culture significantly differed according to the status of injured participants reporting injury to the Hospital Infection Control Unit ($p<0.05$) and hypothesis H_{12} in the study was accepted. As the safety culture points of participants increased, it appeared the rates of reporting work accidents increased. This situation indicates that employees with democratic safety culture attitudes abide by the practices related to work safety in the institution, do not stay unregistered and report injuries to the Hospital Infection Control Unit.

Limitations of the study

As the research only covered Giresun province, it cannot be generalized to Türkiye. Research data are limited to employee statements.

CONCLUSION

Assessment of knowledge levels of staff about occupational risk factors observed the fatalist perception was very effective. The fatalism perception was identified to be higher especially for knowledge levels about practice transformed to behavior. The fatalist approach is encountered as a problematic area in terms of work safety.

Reporting of work accidents by employees is one of the most important indicators in assessment of WHS practice in organizational structures. In our study, employees with the desired level of safety culture perceptions appeared to have higher awareness about accident reporting. Additionally, employees developed a positive perspective about the use of personal protective equipment for hazards and risks in the work environment and this perception was identified to have positive interaction with safety culture.

Additionally, it was determined that the attitude of management to safety and how this was perceived by staff was very important in the process of employees creating safety culture perceptions and developing safe behavior.

The results of the study show that safety culture perception is effective on the emergence of safe behaviors in workplaces.

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Conflict of Interest

The author declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Author Contributions

Plan, design: BK, YO; **Material, methods and data collection:** BK; **Data analysis and comments:** BK; **Writing and corrections:** BK, YO.

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