RESEARCH ARTICLE

LOW LEVEL OF FOOD HANDLING PRACTICES AMONG FOOD-HANDLERS IN SELECTED RESTAURANTS IN GGABA KAMPALA, MAKINDYE DIVISION UGANDA: AN IMPLICATION FOR SAFTETY TRAINING AND REGULATION

Ismail Bamidele Afolabi[1], Abdul Mujeeb Babatunde Aremu[2], Ada Abaku[3], Shamsuddeen Suleiman Yahaya[4], Abdullahi Lawal Aliyu[1], Bashir Mansir Ango[1], Abdullahi Yusuf[5] and Nnodimele Onuigbo Atulomah[1]

1. Faculty of Science and Technology, Department of Public Health, Cavendish University, Kampala, Uganda.
2. Faculty of Health Sciences, Department of Human Anatomy, Islamic University in Uganda, Kampala Campus, Kampala, Uganda.
3. Department of Chemical Pathology, University of Port Harcourt Teaching Hospital, University of Port Harcourt, Nigeria.
4. Katsina State Primary Health Care Agency, Katsina, Nigeria.
5. National Open University of Nigeria (NOUN).

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Abstract

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Background: Food borne diseases remain a major global public health issue with increased morbidity and mortality associated with consuming contaminated food material mostly predicted by the food handlers' level of hygiene during the course of food preparations.This study assessed the level of food-handling behaviors among food-handlers in selected Restaurants in Ggaba, Kampala and determined whether demographic characteristics predict the risk of food-borne diseases.

Methodology: The study was a food vendor-based cross-sectional study employing a researcher administered questionnaire to capturepertinent data on the food handling practices among 286 randomly selected participants measured on a 4-point likert scale responses. The variable items were computed together using SPSS version 25 to assess the score levelreported using simple descriptive statistics and further binary categorization was done for all the variables to explore the demographic predictors of poor food-handling behaviors using logistic regression. Analysis of variance was used to test differences in the level of food-handling practices across demographic characteristics at a cut-off of (p≤0.05) level of significance.

Results: It was found out that the level of safe food handling practices measured on 18-point reference scale reported a mean score of 6.62 (CI= 6.33±6.90)and SD of ±2.45, denoting 37% of the complete safe food-handling practices expected from the respondents. Categorically, the findings showed that less than half of the respondents (43.4%) displayed good safe food-handling behavior. Older respondents (≥ 61 years) and food-handlers with primary educational attainment among

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Corresponding Author:- Afolabi I.B
Address:- Faculty of Science and Technology, Department of Public Health, Cavendish University, Kampala, Uganda.

others insignificantly demonstrated the poorest scores for safe food-handling behaviors. It was further observed that male respondents displayed the lowest score for safe food-handling practices (F=4.039, p=0.045). Similarly, at bivariate level, male respondents are 1.8 times more likely to display poor food-handling practice compared to females (AOR=1.8, 95% CI=1.07±3.08) whereas at multivariate level, no significant demographic predictor was found out.The findings further showed that less than half of the respondents (41%)self-reported to initiate hand washing most of the timebefore handling food, while only 1 in every 3 respondentssometimes employ hand gloves during food-handling procedure, more than two-third of the respondents (71.7%) do not always put on a face mask while handling food. By gender, 71% of them were Females of 40 years of age or below and 4 out every 5 participants (89.5%) had primary educational attainment or below.

Conclusions: The study indicated a poor and unsatisfactory low level of Food-Handling Practices among Food-Handlers in the region mainly predicted by the gender of the respondents, and raised the need for personalized health education and training on safe handling of food as well as improved sanitation and personal hygienein order to avert potential health threats to consumers.

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Background:-

Infections resulting from contaminated food and water which spreads from person to person are known to remain as a serious medical and public health problem particularly in developing countries with tropical climates and low altitudes and 70% of diarrheal episodes resulting from them are asscociated with the ingestion of contaminated foods [1]. They are more prevalent among the poor, who are negatively affected by low socio-economic conditions, poor personal and environmental hygiene, over-crowding, and limited access to clean water [2,3]. Infections due to contaminated food has also been previously reported by the World Health Organization (WHO) as the most widespread health problem in the contemporary world, and an important cause of reduced economic productivity [4].

Globally, World Health Organization estimated in 2017 that approximately 600 million individuals fall ill after consuming contaminated food resulting in approximately 33 million healthy years; foodborne infections account for 40% magnitude of diseases among under 5 years [1] and as a result, foodborne illness can, therefore, be considered not just the developing countries problem but a major international health problem and an important cause of reduced economic growth which is particularly high when food is prepared for a large number of people at the same time, most especially in canteens and restaurants [5,6].

It is known that in Uganda and some other places in sub-Saharan Africa, street restaurants are noted for selling foods and drinks at reduced prices thus providing more affordable means for people to obtain nutritionally balanced meals outside the home. However, the estimated prevalence of people who patronizes food-vendors globally was previously reported in a study to be around 2.5 billion [7] but recently it would have grown beyond our estimation. Considering the fact that street food has become an indispensable part of both urban and rural diets, in developing countries, some public health risk is linked with the consumption of street food. While it is expected that street food meets the nutritional needs of consumers, it is also necessary to ensure its safety from contaminants and microorganisms for the likelihood of contracting food-borne infection may be highly associated with eating from home [6,8]. Reports from some studies have associated the predictors of food-borne infection risk factors and outbreak to eating away from home especially in restaurants which leave such vendors with a role play in reducing food-borne disease outbreaks [9,10] by addressing food-handler related risks factors in such establishments [6] while in some studies like that of [11,12,13,14], the outbreaks are linked to improper and poor food handling practices at the food establishments with most frequently reported foodborne disease risk practices involving poor environmental hygiene, lack of personal hygiene among food handlers employed for the preparation of foodstuffs, inadequate storage of foods and drinks, inadequate cooking, contaminated equipment, improper holding

temperatures as well as food from unsafe sources calling for an integral role by the food handlers in such establishments towards reducing food safety risks.

Ensuring good personal hygiene to avoid transmission of pathogens to food by the food-handlers hands has been reported as the most effective way to reduce the risk of food-borne diseases as well as the spread of the infection [13,15]. Additionally, some studies cited developing and educating or training a workforce knowledgeable through programs in food safety and hygiene as being necessary in improving food safety in food services establishments [16-18]. However, ensuring food hygiene and safety practice among vendors is one of the challenges that has been in existence for decades because despite information adequacy on safe food handling methods, food handlers often do not embark on food handling practices as similar reports have been demonstrated in several studies conducted within sub-Saharan Africa [19-21,26].

The hygiene of foods sold on the streets around Ggaba road, Kampala has been a major source of concern for Kampala Capital city Authorities and other stakeholders following the emergence of restaurants in the area in response to the common growth in the population of university students around the area who eat away from home. In view of this and in an attempt to limit the public-health issues resulting from consuming contaminated food, ensuring restaurants adherence to high standard food safety regulation and hygiene cannot be over stated. It is however, prudent to investigate and document demographic predictors associated with the level of food handling practices among food-handlers in different food joints in Ggaba Kampala.

Method:-
Study design
The study was a descriptive food-vendor based cross-sectional study that employed a researcher administered questionnaire to collect quantitative data on the level of food handling practices among 286 randomly selected food handlers across restaurants situated at Ggaba-Kampala Makindye Division, Uganda. The items for the frequency of their safe food-handling practices were measured on a 4-point likert scale responses of "None of the time", "Some of the time", "Most of the time" and "All of the time" totaling to a maximum reference scale of 18 point.

Estimation of sample size
The study involved 286 respondents using Kish Leslie formula (1965) showed below on the account of 21.6% prevalence of intestinal parasitic infections among food handlers as previously reported in a study [22]

$$N = \frac{Z\alpha^2 p(1-p)}{d^2}$$

10% was added for response bias to achieve the sample of 286
WhereP = reported true population proportion of intestinal parasitic infection (21.6%).
$Z\alpha$ = Standard normal deviate at 95% confidence interval corresponding to 1.96.
D= Level of precision of 5%.

Sampling procedures
The study adopted a systemic random sampling, where every two restaurant located in the study area was selected to give all restaurants in the population an equal chance of being selected until the desired sample size was attained.

Inclusion criteria and Exclusion criteria
Every consenting food-handler in the selected restaurants in the study area was included. The study excluded all food handlers in the selected restaurants who did not consent to participate in the study. Food-serving restaurants in Ggaba outside the selected sample frame were also excluded.

Data collection, Processing and Analysis
A researcher administered questionnaire structured to match the objectives of the study which assesses the level of safe food handling practices among the respondents as well as their demographic information was used to capture uantitative data. The responses on a 4-point likert scale were merged together to a total of 18 point maximum scale of reference on (SPSS) version 25 to compute the score for the variable which was then analyzed using simple descriptive statistics. Analysis of variance (ANOVA) was used to test differences in the level of food-handling practices across demographic characteristics with cut-off set at a ($p\leq0.05$) significance level. Additionally, further dichotomous categorization was done for all the variables and the level of food handling practices was presented as

"poor food handling practice" if respondents scored below the mean score and "good food handling practice" if respondents scored the mean score on the reference scale or above. The poor and good food-handling practices were then coded as "1" and "0" respectively for binary logistic regression on the demographic predictors of the poor food-handling practices displayed by the respondents which was then reported using Adjusted Odds ratio and the confidence interval with $p \leq 0.05$ level of significance.

Instrument quality control
The questionnaires were pretested using restaurants outside the study area to capture data and following expert recommendation from the pilot study, the tool was redefined before the main study data collection procedures.

Ethical issue
Informed consent was obtained from the food handlers prior to participation in the study procedures and utmost confidentiality was attached to the collected data.

Results:-
Demographic characteristics of the respondents
The study showed that relatively two-third of the respondents were between the age of 31 and 40 and the least reported age group (2.8%) were participants between 61years and above. Females respondents constitute the majority (71%), almost half of the respondents (48%) reported to be Catholic, 84% of the respondents reported to speak Luganda, 8 out of every 10 respondents were married and majority (72%) of them had at least primary education (*refer to table 1 for full detail*).

Table 1:- Findings on demographic characteristics.

Variables	Respondents in this study N=286	
	Frequency (N)	**Percentage (%)**
Respondents' age(in years):		
• 18-30	40	14.1
• 31-40	204	71.3
• 41-50	19	6.6
• 51-60	15	5.2
• ≥61	8	2.8
Gender:		
• Male	84	29.4
• Female	202	70.6
Religions:		
• Catholic	136	47.6
• Protestant	66	23.1
• Islam	56	19.6
• Pentecost	16	5.6
• Others	12	4.1
Languages:		
• Luganda		
• Lunyankoli	240	83.9
• Acholi	20	7.0
• Others	10	3.5
• Iteso	10	3.5
	6	2.1
Marital Status:		
• Widowed	4	1.4
• Divorced	22	82.5
• Single	24	8.4
• Married	236	82.5

Educationational attainment: • Tertiary education • Secondary education • Non-formaleducation • Primary education		
	14	4.9
	16	5.6
	50	17.5
	206	72.0

Note: demographic variables were further dichotomously categorized based on majority and other counterparts in each case

Food-handling practices

It was found out in this study that less than half of the respondents (41%) self-reported to wash their hands most of the time before handling food, relatively one-third of the respondents which constitute the majority washes their plates most of the time prior to food serving, less than half of the respondents sometimes employ head gears during food handling, while one-third the respondents (38.1%) sometimes wear hand gloves during food handling, 7 out of every 10 food-handlers do not at any time use face mask during food handling, relatively the same number of respondents self-reported not to wear aprons at any time while dealing with food (*refer to table 2*).

Table 2:- Findings on the self-reported safe food handling behaviors.

Statement for consideration	Respondents in this study N=286	
	Frequency (N)	Percentage (%)
Frequency of hand washing prior to food-handling: • Most of the time • Some of the time • None of the time • All of the time	117	40.9
	97	33.9
	10	3.5
	62	21.7
Frequency of plateswashing prior to serving food: • Most of the time • All of the time • Some of the time • None of the time	110	38.5
	101	35.3
	70	24.5
	5	1.7
Frequency of using head gears while handling food: • Some of the time • Most of the time • None of the time • All of the time	111	38.8
	86	30.1
	66	23.1
	23	8.0
Frequency of utilizing hand gloves while handling food: • All of the time • Most of the time • Some of the time • None of the time	8	2.8
	36	12.6
	109	38.1
	133	46.5
Frequency of wearing a face masks while handling food: • All of the time • Most of the time • Some of the time	4	1.4
	20	7.0
	57	19.9

• None of the time	205	71.7
Frequency of wearing apron while handling food:		
• All of the time	4	1.4
• Some of the time	26	9.1
• Most of the time	39	13.6
• None of the time	217	75.9

Note: The responses were transformed by computation for further dichotomous categorization of their practices

Table 3:- Summaries of descriptive statistics computed for level of safe food-handling behaviors.

Variables*	Max. Score on Reference scale	$\bar{x}$(SE)	Confidence-interval	±SD	Variance	Level by prevalence
Level of safe food-handling behavior displayed	18	6.62(0.15)	6.33±6.90	2.45	6.00	36.7%

Level of Food-handling practices
The level of food handling practices among the study respondents as measured on 18-point maximum scale of reference demonstrated that food-handlers in the study displayed a general mean score of 6.62 (CI= 6.33±6.90) on assessment of the level of their food-handling and standard deviation of ±2.45 which constitute 37% of the total safe food handling practices expected from the respondents (*see table 3*).

Relationship between demographic characteristics and the level of food handling practices
Analysis of variance was conducted to test the differences in the level of safe food handling practices across the demographic characteristics, and it was found out that despite the less than average mean scores of safe food handling displayed generally by the respondents, gender is the only demographic characteristic observed to be associated significantly with the low score for food-handling practices, where it further shows that males displayed the poorest level of food of handing practices with a mean score of 6.17 (F=4.039, p=0.045), respondents (≥ 61 years), handlers with primary education and with no stated religion among other demographic variables insignificantly displayed the poorest score safe food-handling practices (*see table 4 below*).

Table 4:- Comparison of the level of food handling practices across demographic characteristics of the respondents using ANOVA.

Variables	$\bar{x}$(SE)	±SD	F-value	p-value
Respondents' Age (in years)				
• 18-30	6.13(0.41)	2.61		0.361
• 31-40	6.80(0.18)	2.54		
• 41-50	6.31(0.38)	1.63	1.091	
• 51-60	6.07(0.45)	1.75		
• ≥ 61	6.00(0.53)	1.51		
Gender				
• Male	6.17(0.25)	2.28		**0.045***
• Female	6.80(0.18)	2.49	4.039	
Marital status				
• Single	6.38(0.31)	1.53		0.944
• Married	6.63(0.166)	2.55	0.126	
• Divorced/separated	6.72(0.43)	2.02		
• Widows/widowers	6.25(1.65)	3.30		

Educational attainment				
• Non-formal education	6.84(0.38)	2.72		0.532
• Primary education	6.50(0.17)	2.41		
• Secondary education	6.75(0.50)	1.98	0.735	
• Tertiary education	7.35(0.66)	2.47		
Religion				
• Islam	6.42(0.23)	1.73		0.601
• Protestant	6.73(0.29)	2.38		
• Catholic	6.76(0.23)	2.74	0.688	
• Pentecost	6.06(0.71)	2.83		
• Others	5.92(0.45)	1.56		
Language				
• Luganda	6.65(0.16)	2.51		0.949
• Lunyankoli	6.20(0.55)	2.44		
• Acholi	6.40(0.58)	1.84	0.180	
• Iteso	6.67(0.71)	1.75		
• Others	6.70(0.67)	2.11		

Dynamics of the study variables following dichotomous categorization

The study variables were transformed into binary forms to ascertain the demographic predictors of poor food-handling behaviors among the respondents and based on the categories, it can be observed that more than half of the respondents ((162/286) (56.6%)) displayed poor food-handling practices (*see chart 1*) and for the distribution of the demographic information, 83% which constitute the majority are 40 years of age or below, nearly three-quarters of the food-handlers are female (71%) and approximately 90% of the respondents had primary education or below (*refer to table 5 for details*).

Table 5:- Frequency distribution for the dichotomous categories of the study variables (N=286).

Variables	Frequency (N)	Percentage (%)
Respondents' Age (in years)		
• ≤40	238	83.2
• >40	48	16.8
Gender		
• Male	84	29.4
• Female	202	70.6
Religious group		
• Catholic/protestant	202	70.6
• Others	84	29.4
Spoken Language		
• Luganda	240	83.9
• Others	46	16.1
Marital Status		
Single	24	8.4
Married	262	91.6
Educational Attainment		
• ≤Primary	256	89.5
• >Primary	30	10.5
Food handling practice		
• Poor	162	56.6
• Good	124	43.4

Predictors of poor food-handling practices among the food-handlers
Findings from this study regarding the predictors of poor food-handling practices following categorization showed that and at bivariate level, gender is the only demographic predictor independently associated with poor food-handling practices where male food-handlers are 1.8 times more likely to display poor handling of food compared to females (AOR=1.8, 95% CI=1.07±3.08), however, at multivariate level no demographic variable predicts the poor food handling practices. In addition to the logistic regression, the non-parametric chi-square test for the differences in the proportion of the variables category among the respondents showed an all-round statistical significant difference ($p<0.001$) (*refer to table 6 for full details*).

Chart 1: Prevalence of poor food-handling practice among the study respondents

Table 6:- Demographic predictors of poor food-handling practices among the study respondents.

RESPONDENTS IN THIS STUDY N=286								
Variables	**Food-handling practices**		χ^2	**p-value**	**Crude Odds Ratio (CI)**	**p-value**	**AOR(CI)**	**p-value**
	Poor n(%)	**Good n(%)**						
Age of respondents								
≤40 years >40 years	129(79.6) 33(20.4)	109(87.9) 15(12.1)	126.2	**<0.001***	0.5 (0.28-1.04) 1	0.066	0.70(0.32-1.51) 1	0.358
Gender								
Male Female	56 (34.6) 106(65.4)	28(22.6) 96(77.4)	48.69	**<0.001***	1.8 (1.07-3.08) 1	**0.024***	1.51(0.82-2.81)	0.189
Religion								
Catholic/protestant Others	107(66.0) 55(34.0)	95(76.6) 29(23.4)	48.69	**<0.001***	0.59(0.35-1.11) 1	0.05	0.62(0.36-1.06) 1	0.080
Language								
Luganda Others	134(82.7) 28(17.3)	106(85.5) 18(14.5)	131.6	**<0.001***	0.81(0.43-1.55) 1	0.528	0.83(0.43-1.60)	0.574
Marital status								

Single Married	13(8) 149(149)	11(8.9) 113(91.1)	198.1	**<0.001***	0.89(0.38-2.08) 1	0.798	0.97(0.41-2.31)	0.949
Educational level								
≤Primary >Primary	148(91.4) 14(8.6)	108(87.1) 86(12.9)	178.6	**<0.001***	1.57(0.73-3.36) 1	0.247	1.47(0.68-3.19)	0.327

Note: Crude odds ratio (p≤0.025) and AOR are from the bivariate and multivariate logistic analysis respectively

Discussion:-

Demographically, 286 randomly selected food handlers enrolled in this study for capturing of pertinent data related to food-borne disease prevention with more than three-quarters of them falling between the age group 40 years or below. This is almost in line with the finding from a previously conducted food service facility-based study in Uganda [18] and another similar KAP study conducted in West Africa [23]. By gender, majority of this study respondents are female, this report concords with the findings from a study conducted in Nigeria [6], this however is an indication that in African setting, majority of food-handlers are always likely to be females. Again, demographically, 7 out of every 10 food-handlers had primary educational attainment, a report slightly lower than what had been reported in similar studies about food-handlers in Uganda and Nigeria [6, 18] despite the proximity to schools situated areas like both studies mentioned above. This could imply that here in Uganda, vendors that engage in street food serving related services are handled by people of lower educational attainment and the risk of food-borne disease could be apparently linked to their inadequacy of information related to knowledge of food-borne infection.

The report from this present study generally on assessment of the level of food-handling practices showed a low level of safe food-handling practices as measured on 18-point maximum scale of reference, where more than half of the food-handlers demonstrated unacceptable poor food-handling behaviors and this is among food-handlers' population that harbor the greatest magnitude of food-borne infection causing pathogens compared to other African countries [24] and boasting a prevalence of 51%. Reports also highlighted that millions of individuals in this geographical setting are annually discovered to be infected with food-borne disease [25]. Evidence based on the reported 37% of the expected complete safe food-handling practice displayed by the food-handlers is an indication to the food-handlers reluctancy to engage in safe food-handling practices. This is in not in line with what was reported in a similar lower sample cross-sectional study [6]. Furthermore, this finding also reported insignificant differences in the mean score of food-handling practice across the educational level and age among other demographic variables where it was observed that older respondents of 61 years of age or above and food-handlers with primary education reported the lowest scores for food-handling practices even though it is not significant. However, it implies a need to focus on these demographic groups of vulnerable food-handlers for better awareness and adequate knowledge as well as positive perception about food-borne infection among this population so as to inform satisfying and appropriate prevention practice although a previous similar study by Afolabi*et al*., [26] has demonstrated that there is no significant relationship between knowledge of food handlers and their practices of food-borne prevention. This is because the variability in the scores for the safe food-handling practices and the demographic predictors of the poor food handling behaviors were not explored which has now been fully assessed by this present study.

The findings from this study further showed that male respondents significantly displayed the lowest score for the level of the food-handling practices which is an indication that females will somehow tend to practice safe food-handling that can prevent the risk of food-borne infection when compared to male, it was further observed that males are more likely to display poor food-handling practice compared to females although not a significant predictor at multivariate level. This makes them a perpetrator of likely risk of food-borne disease to potential consumers. The implication of this is a targeted health education focusing on safe food-handling practices for food handlers especially the male counterparts. Although previous studies like that of Baluka [18] is in contrast to what our study reported regarding gender, reporting that gender has no association with safe food handling practice. However other studies by [21,27] reported similar findings with our report where female handlers in their studies displayed better hygiene and safe food handling scores than male counterparts.

Additionally, studies like that of [6,18,28] are supported by the report from this study where less than half of our respondents self-reported to initiate hand washing frequently prior to food stuffs handling, the report that one in

every three food handlers frequently embark on plates washing prior to making use of them concords with a previous reports by [6, 28]. This shows by proportion, the degree of poor practice demonstrated by the respondents in our study which will likely in turn translate to high risk of food-borne infection should care not be taken.

Again, more than one-third of the food-handlers in this study reported to not always employ head gears during food-handling procedures, a report in contrast to a similar study conducted among food-handlers in Nigeria [6]. Could this unacceptable poor food-handling practice be an indication that awareness of the respondents is not adequate in respect to their hair harboring microorganisms that has the potential of contaminating foodstuffs or neglecting this fact is what they have chosen to handle food with? Nevertheless, no matter how this scenario is portrayed, there is a need for food-handlers to initiate hygienic and safe food-handling practice by always covering their hairs using head gears implying a gap that health education needs to fill for better safe food-handling behaviors.

Furthermore, regarding the practice of frequently preventing food-borne infection via the use hand gloves, one in every four food-handlers self-reported not to use hand gloves anytime during food-handling procedure and this is comparatively in contrast to what was reported by [6]. The self-reported behaviors of these respondents are alarming considering the presently in vogue corona virus pandemic and other diseases of infectious origin that has the potential of transmissibility through poor hygiene. Conclusively, face marks and aprons are not always being employed by our study respondents during food handling process, this might be linked to inadequacy of safety equipment within their vendors , and this could also explain the poor food-handling practice they displayed since it is known that one of the major obstacles to food-handlers behavioral change remains lack of motivating safety equipment as previously reported in a study conducted in west Africa [29], supply of safety equipment as part of interventions towards informing better food-handling practices should be inclusively considered by the regulatory bodies. Conclusively, this study has highlighted the predicting demographic information that could be a target of health education geared towards reducing the burden and the risks predisposing consumers to the threat of food-borne infections in this geographical setting.

Conclusion and Recommendation:-
The study indicated an unsatisfactory low level of Food-Handling Practices that should not be underestimated among Food-Handlers in the region, and raised the need for education and training on safe handling of food as well as improved sanitation and personal hygiene, to avert potential health threats to consumers.

However subsequent research should be conducted on the dynamics of variables predicting food-handling practices among food handlers in this region for this study as the first to be conducted in Ggaba restaurants was only limited to investigating the food handling practices and the associated demographic characteristics of the food handlers.

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