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### **Aims & Scope**

Compared to other fields, developments and innovations in the fields of medical and health sciences are very fast. In this century, where the human population is rapidly increasing and technology is developing rapidly, health problems are constantly changing and new solutions are constantly being brought to these problems. With the Covid 19 epidemic, it has emerged that a health problem affects all humanity and all areas of life. For this reason, this conference focused on the changes and innovations in the field of Medical and Health Sciences.

The aim of the conference is to bring together researchers and administrators from different countries, and to discuss theoretical and practical issues of Medical and Health Sciences. At the same time, it is aimed to enable the conference participants to share the changes and developments in the field of Medical and Health Sciences with their colleagues.

### **Articles: 1-5**

#### **CONTENTS**

Understanding Factors Affecting the Use of Mobile Health Innovation, Attitude and Synthesis / Pages: 1-7

*Sami S. Binyamin*

Quality Control of Diet Herbal Teas Commercialized in the Region of Sidi Bel Abbès / Pages: 8-16

*Mohammed Adil Selka, Achouri Mohammed-Yacine, Chenafa Amel, Bellifa Nazim*

Formulation and Evaluation of a Disinfectant Solution Based on Natural Products / Pages: 17- 21

*Ouarda Benaziz, Mohamed Otsmane, Nassim Zoubiri*

Variants of Modern Treatment of Patients with Chronic Hemorrhoids / Pages: 22-25

*Volodymyr Sulyma*

Intracardiac Thrombi as a New Variant Cardiovascular Injury in a Previously Healthy COVID-19 Child:  
Case Report and Follow Up / Pages: 26-29  
*Natalya Kukhtinova*

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**ICMeHeS 2022: International Conference on Medical and Health Sciences**

## **Understanding Factors Affecting the Use of Mobile Health Innovation, Attitude and Synthesis**

**Sami S. BINYAMIN**  
King Abdulaziz University

**Abstract:** Advancements in information and communication technologies have positively affected various sectors, and healthcare is no exception. Healthcare industry has been affected by smartphones that caused the use of mobile phones for providing healthcare services, which is known as Mobile health (mHealth). Regardless the benefits of mHealth, the success of this technology ultimately depends on public acceptance. Therefore, the objective of this research is to evaluate the acceptance of mHealth applications. An online survey was employed to collect data related to the variables in the conceptual model. This study utilizes the multivariate PLS-SEM method to evaluate the suggested model. The results indicate that four factors are important for the acceptance of mHealth: perceived usefulness, subjective norms, facilitating conditions and attitude toward behavior. In conclusion, the four factors are important, and decision makers should pay more attention to them to improve the public acceptance of mHealth.

**Keywords:** Technology acceptance, Technology adoption, Mobile health, mHealth, Healthcare

### **Introduction**

Progress in information and communication technologies has benefitted many disciplines and sectors. By triggering "Mobile Health" (mHealth), smart phones have transformed health, activity (Hoque & Sorwar, 2017; Chen et al., 2018; Binyamin & Zafar, 2021). Due to the general availability of mobile phones and the scarcity of health facilities, mobile health services have increased on a large scale (Cho & Kim, 2020). The authors identified several transferable health benefits, including increased access, which the authors describe in (Alam et al., 2020). In turn, the authors reinforced the authority users have over their own health (Binyamin & Hoque, 2020). The authors suggested the right health strategy to minimize time and geographical constraints (Zhang, et al., 2019). It was recommended an advanced way to reduce healthcare costs (Mansour, 2017).

It was reported that public acceptance of these improvements would determine the expansion and benefits of mobile health and its ultimate success (Keen & Roberts, 2017; Binyamin & Hoque, 2020; Binyamin & Zafar, 2021). The benefits of health services would be lost if people did not use them (Ahmed et al., 2014; Khatun et al., 2015; Hoque & Sorwar, 2017). According to several surveys, the adoption of target consumers and mobile health services is now neglected. This indicates potential barriers to the development of mobile health services. Although only a few researchers have studied this subject, it is crucial to know what motivates people to adopt mobile health care (Binyamin & Zafar, 2021).

Binyamin and Zafar (2021) developed a conceptual approach to measuring portable health adoption based on a comprehensive literature evaluation and multi-phase meta-analysis. Firstly, the researchers reviewed and evaluated 49 scientific papers published between 2010 and 2020 concerning the approval of mobile health technologies. In the second phase, 100 structures, 26 dependent factors, and 170 combinations of pathways were studied in these documents. Then, we determined the most popular correlates in these studies. The authors then suggested a conceptual model based on assessing the significance and strength of recognized associations. Thus, there are five independent factors (perceived usefulness (PU), perceived ease of use (PEOU), subjective criteria (SN), conditions of facilitation (FC), and attitude toward behavior (ATB)) and two dependent factors

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(behavioral intention (BI) and actual use (AU)) as critical factors for acceptance of mobile health services. Figure 1 illustrates the conceptual model and the seven assumptions proposed by Binyamin and Zafar (2021). However, the scientists never experimentally looked at their theoretical framework. This research aims to assess the scale and structural patterns of a theoretical framework using real-world data. This shows that their conceptual model for measuring how well mobile health apps is accepted works and is reliable.

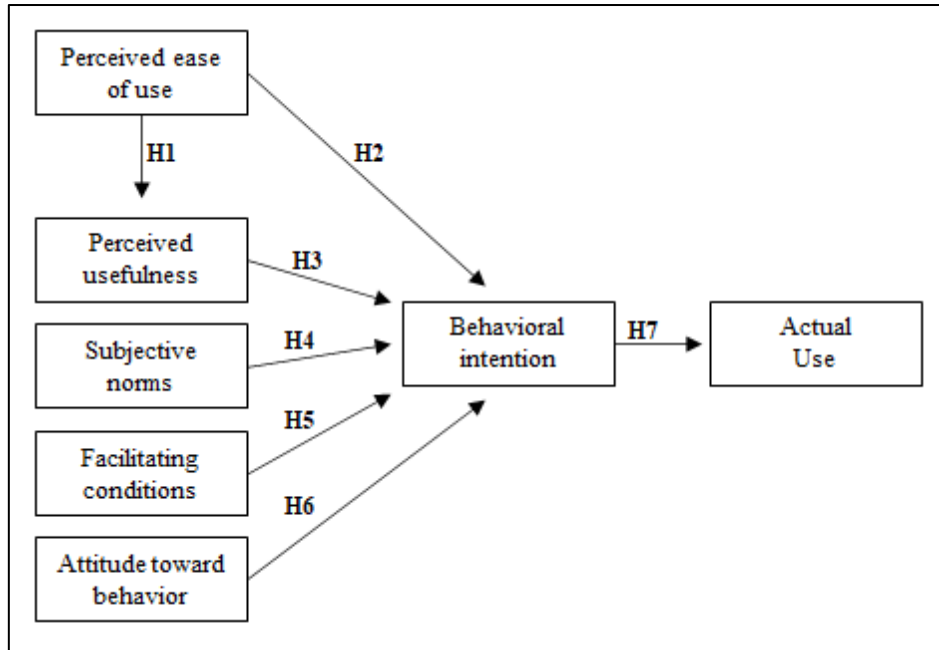


Figure 1. The research, conceptual model

The remaining parts of the paper is arranged as follows: Section 1 introduces the state of art of Mobile Health. The "Methodology" Section 2 discusses the mobile health technology in Saudi Arabia in detail. Section 3 covers the obtained results. These results are discussed in section 4. We conclude the paper in Section 5.

## Methodology

### Measurement of Constructs

To validate the proposed assumptions, a survey was conducted on Google Forms covering all the variables in the conceptual model of online search. All indications were derived from previously published studies (Davis, 1989; Venkatesh et al., 2003; Venkatesh et al., 2012), with only minor modifications to make them applicable to mobile health technology.

### Instrument Development

As with most technological acceptance studies, we do quantitative work. In this context, online surveys were used to collect comprehensive information. The study proposed is divided into two sections. Section A includes multiple-choice questions about user demographics, including gender, age, educational level, marital status, and daily use of mobile devices (in hours). Respondents were asked to choose the option most reflective of their condition. In Section B, 21 positive reports express combinations of forms. On a five-point Likert scale, with one point for strong disapproval and five points for strong agreement, the appropriateness of the fixtures was determined. The initial draft of the questionnaire was prepared in English. Since this study was directed at Saudi users of mobile health technologies, Arabic is the mother tongue; the questions had to be translated into Arabic. The online investigation was translated from English to Arabic using the reverse translation method (Brislin, 1986). The exact meaning and originality will be maintained by appointing two Arabic-speaking and fluent English-speaking teachers who have the necessary experience to create surveys. The first faculty member translated the questions from English into Arabic, while the second translated the questions into English. This step was required to ensure survey respondents understood the questions and were not left out because they could not speak English.

## Data Collection

Our work aimed to explain user behavior and experience with mobile health technology in Saudi Arabia. Following most technology acceptance studies; a nonprobability convenience sampling technique was used to collect data from the target population. Electronic invitations were sent through social media and WhatsApp mobile app groups for participant recruitment. Respondents were invited to participate in the survey through electronic invitations, and the online link to the questionnaire was attached. The questionnaire was open for two weeks. Concerning ethics, all participants provided their informed consent, online at the beginning of the survey. The ethical approval of the survey was also obtained from King Abdelaziz University's Dean of Scientific Research. In total, participants provided 319 responses. The authors conducted a preliminary review to monitor the data and ensure that the model trials did not include outliers, missing data, or unsolicited responses. This study uses the standard deviation to detect non-binding responses and linear patterns. Answers rated 0 were considered suspicious and were not fully committed to the questionnaire. So, during the preliminary review, 8 replies were thrown out, and 311 responses were used to look at the data. Demographic information for participants is presented in Table 1. Analysis of socio-demographic data shows that most participants are female (61%). Most participants (67%) are under 36 years of age. This is consistent with Saudi Arabia, where most of the population is composed of young people. In terms of academic level, 95% of participants have a licentiate, and more than 36% have a master's degree. Approximately 82% of respondents reported using their mobile devices for more than 3 hours each day.

Table 1. Demographic characteristics of participants

Characteristics	Groups	Frequency	Percentage
Gender	Male	120	38.59%
	Female	191	61.41%
Age	18–25 years old	138	44.37%
	26–35 years old	71	22.83%
	36–45 years old	52	16.72%
	Above 45 years old	50	16.08%
Education	None	17	5.47%
	2-year diploma	52	16.72%
	Bachelor's degree	127	40.84%
	Graduate degree	115	36.98%
Marital status	Married	170	54.66%
	Divorced	132	42.44%
	Single	4	1.29%
	Widow / widower	5	1.61%
Mobile daily use	Less than 1 hour	7	2.25%
	1-3 hours	49	15.76%
	4-6 hours	135	43.41%
	More than 6 hours	120	38.59%

## Data Analysis

Our inquiry utilized the multivariate PLS-SEM method implemented by the Smart-PLS software 3 to assess the suggested model and evaluate the accuracy of the correlations between the input and output variables. This method has been largely used to test and validate assumptions (Hair et al., 2017). SEMS-PLS is also flexible when it comes to sharing data and having a small sample size (Hair et al., 2018).

## Results

### Measurement Model Evaluation

The validation measurement results of model are presented in Table 2. All external loads above 0.60 show that the reliability of the indicators has been determined (Hair et al., 2017). The author evaluated the reliability of the assemblies using composite reliability (CR) and Cronbach's alpha coefficient (AC), which has a recommended limit value of 0.70 or more (Hair et al., 2018). Based on Table 2, the composite reliability estimates ranged from 0.85 to 0.93, while the Cronbach alpha estimates ranged from 0.74 to 0.89. Consequently, Table 2 indicates that



the reliability of the structures is satisfactory. The scaling model is convergent validity because the extracted mean, variance (AV) is greater than 0.5 (Chin, 1998).

Table 2. Measurement model evaluation

Constructs	Indicators	Loadings	CR	CA	AVE
		> 0.6	> 0.7	> 0.7	> 0.5
Attitude toward behavior (ATB)	ATB01	0.82	0.89	0.81	0.72
	ATB02	0.84			
	ATB03	0.88			
Actual use (AU)	AU01	0.87	0.86	0.77	0.68
	AU02	0.90			
	AU03	0.69			
Behavioral intention (BI)	BI01	0.92	0.93	0.88	0.81
	BI02	0.86			
	BI03	0.92			
Facilitating conditions (FC)	FC01	0.84	0.85	0.74	0.66
	FC02	0.85			
	FC03	0.75			
Perceived ease of use (PEOU)	PEOU1	0.92	0.93	0.89	0.82
	PEOU2	0.85			
	PEOU3	0.93			
Perceived usefulness (PU)	PU1	0.86	0.91	0.85	0.77
	PU2	0.90			
	PU3	0.87			
Subjective norms (SN)	SN1	0.83	0.87	0.78	0.70
	SN2	0.90			
	SN3	0.78			

CR = Composite reliability, CA = Cronbach's alpha coefficient, AVE = Average variance extracted

The author evaluated the discriminant validity of the suggested model using the Heterotrait Monotrait Ratio (HTMT) (Henseler, Ringle, & Sarstedt, 2015). This indicator reflects the strength of the relationship between two entities. Table 3: HTMT scores do not exceed the criterion of 0.9, which demonstrates the discriminative validity of the seven components (Henseler, Ringle, & Sarstedt, 2015). The obtained results of the measurement model evaluation show that the reliability and validity of the suggested model are not very important.

Table 3. Heterograft monotrait ratio

	AU	ATB	BI	FC	PEOU	PU
ATB	0.82					
BI	0.76	0.82				
FC	0.63	0.79	0.64			
PEOU	0.41	0.54	0.34	0.60		
PU	0.72	0.85	0.68	0.70	0.55	
SN	0.62	0.62	0.66	0.59	0.24	0.59

### Structural Model Assessment

It is essential to evaluate the collinearity of a proposed model to ensure that there are no strong correlation structures. Using the Variance Inflation Factor (VIF), this study examines the collinearity of the suggested model following the recommendations of Hair et al. (2017). Table 4's VIF values are below 3.0, which means that the level of cleanliness is acceptable.

Table 4. Variance inflation factor scores

	AU	BI	PU
ATB		2.40	
BI	1.00		
FC		1.89	
PEOU		1.49	1.00
PU		2.27	
SN		1.46	

Following the advice of PLS-SEM academics (Hair, Hult, Ringle, & Sarstedt, 2017; Hair, Sarstedt, Ringle, & Gudergan, 2018), the correlations between independent and dependent variables were evaluated using three metrics: path coefficients ( $\beta$ ), t-value, and p-value. As this study tests hypotheses at a significance level of 0.05, only ideas with a p-value less than the significance level of 0.05 are supported (Hair, Hult, Ringle, & Sarstedt, 2017). The significant and nonsignificant associations are displayed in Table 5. The testing of hypotheses shows six meaningful relationships (PEOU  $\rightarrow$  PU, PU  $\rightarrow$  BI, SN  $\rightarrow$  BI, FC  $\rightarrow$  BI, ATB  $\rightarrow$  BI and BI  $\rightarrow$  AU) and one insignificant and one unimportant relationship.

Table 5. Hypothesis testing

	Path	Coefficients ( $\beta$ )	t-Value	p-Value	Result
H1	PEOU $\rightarrow$ PU	0.49	9.14	0.00	Supported
H2	PEOU $\rightarrow$ BI	-0.06	1.35	0.09	Not supported
H3	PU $\rightarrow$ BI	0.13	1.86	0.03	Supported
H4	SN $\rightarrow$ BI	0.22	5.00	0.00	Supported
H5	FC $\rightarrow$ BI	0.10	1.76	0.04	Supported
H6	ATB $\rightarrow$ BI	0.46	6.49	0.00	Supported
H7	BI $\rightarrow$ AU	0.65	13.93	0.00	Supported

Significance level = 0.05, one-tailed

## Discussion

This paper evaluated a previously presented model to ensure its suitability for assessing mHealth technology adoption in Saudi Arabia (Binyamin & Zafar, 2021). The conceptual model in this study states that behavioral intent is influenced by five distinct factors: PEOU, PU, SN, FC, and ATB. This section discusses the variables influencing mHealth adoption in response to the research questions. The model investigated explains 56% of the variance in BI (adjusted  $R^2 = 0.55$ ) and 43% of the variation in AU of mHealth technology (adjusted  $R^2 = 0.43$ ). Our research shows that the intent to use health technology is strongly influenced by PU, SN, FC, and ATB, confirming that six of the seven association analyses is significant. On the other hand, PEOU does not appear to affect the intention to use mHealth technologies. H1, H3, H4, H5, H6, and H7 are required. Based on the findings, the following proposals to facilitate the use of mobile healthcare technology by the public are discussed.

The author suggested that PU, SN, FC, and ATB positively affect behavioral intent (H3, H4, H5, and H6). The obtained results indicate that PU ( $\beta = 0.13$ ,  $p = 0.03$ ), SN ( $\beta = 0.22$ ,  $p = 0.00$ ), FC ( $\beta = 0.10$ ,  $p = 0.04$ ) and ATB ( $\beta = 0.46$ ,  $p = 0.00$ ), and ATB ( $\beta = 0.46$ ,  $p = 0.00$ ) have a good effect on behavioral intent to use portable health; thus, H3, H4, H5, and H6 are acceptable. Four key factors, thus influence consumers:

1. The performance and utility of mobile health
2. The opinions of key stakeholders
3. The availability of resources and assistance
4. Their favorable attitude towards mobile health.

The obtained results are in line with what other studies (Dwivedi, Shareef, Simintiras, Lal, & Weerakkody, 2016; Alam, Hoque, Hu, & Barua, 2020; Alam & Khanam, 2022), and the UTAUT and UTAUT2 technology acceptance forms (Venkatesh et al., 2003; Venkatesh et al., 2012) have found about how people accept mobile health. Since Saudi Arabia is a collective nation with a high level of force-distance, it is expected that SN will positively affect behavioral intention. The user's attitude towards mobile health is the strongest predictor of behavioral intentions among the parameters considered. So, people who make decisions about whether or not to accept mobile health devices should pay more attention to this factor. Indeed, the obtained results from the literature review prove that PEOU has a positive impact on BI when using mobile health technology. Surprisingly, this survey did not find a significant association between PEOU and BI ( $\beta = -0.06$ ,  $p < 0.09$ ); therefore, H2 is rejected. The literature on TAM, UTAUT, and UTAUT2 is said to contradict the rejection of this theory. However, our results are consistent with several research reports on the adoption of portable health. This research demonstrates that PEOU does not influence intent to use mHealth (Sezgin et al., 2017; Deng et al., 2018; Nunes et al., 2019; Duarte & Pinho, 2019; Alam et al., 2020; Alam & Khanam, 2022). Thus, future research on the acceptance of portable health should focus more on the relationship between PEOU and BI. Furthermore, the findings indicate that PEOU is a significant PU indicator of mobile health technology use ( $\beta = 0.49$ ,  $p < 0.00$ ); hence, H1 is accepted. Indeed, consumers are more likely to utilize mobile health technology if it is simple to learn and employ. If the user-friendliness of mHealth is not recognized, users can reject it and

search for an alternative accessible solution. This is due to the fact that mHealth is a fairly new service in Saudi Arabia. In fact, users have little experience with it; hence, the simplicity of the system is vital for this type of user. This conclusion is consistent with previously published studies on technological acceptance models (TAM, UTAUT, and UTAUT2) and acceptance of mobile health (Zhang, et al., 2019; Nezamdoust et al., 2022).

## **Conclusion**

Despite the expansion and benefits of mobile healthcare, the success of this innovation ultimately depends on public acceptance. Previous research indicates that mobile health services are insufficient (Ahmed, et al., 2014; Khatunet al., 2015; Hoque & Sorwar, 2017). Our work focused on empirically analyzing a previously suggested model (Binyamin & Zafar, 2021) and assessing its applicability in mobile health applications' acceptability. The obtained results suggest that PU, SN, FC, and ATB are linked to business intelligence regarding the use of mobile health services. Finally, the four elements are essential, and policymakers should give them greater attention to increase the uptake of mobile health services.

## **Scientific Ethics Declaration**

The author declares that the scientific ethical and legal responsibility of this article published in EPHELS journal belongs to the author.

## **Acknowledgements or Notes**

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**ICMeHeS 2022: International Conference on Medical and Health Sciences**

## **Quality Control of Diet Herbal Teas Commercialized in the Region of Sidi Bel Abbès**

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**Abstract:** Overweight and obesity are defined as abnormal or excessive accumulation of body fat to a level that represents a health risk, it is certainly linked to genetic components but the change in eating habits and the increase in inactivity through urbanization are the main causes of obesity. The most obvious management of obesity consists of a balanced diet and regular practice of physical activity. Traditional herbal remedies exist and can be divided into several groups including laxatives, lipolytic, appetite suppressants, and diuretics. Herbal teas based on these plants must be subject to constant quality control, to ensure patient safety. This study aims to control the quality of five herbal teas; for this, botanical and microbiological controls were done. Falsification detection with mineral substances was carried out using the total ash test. Botanical controls have revealed some elements that do not conform to the standards specified in the monographs, such as the lack of scientific information to guide the patient in his treatment and to identify herbal drugs. Microbiological controls have revealed fungal and bacterial contamination. Mineral falsification was detected in one of the five studied herbal teas. This study has shown the importance of quality control of herbal teas that are widely used by the population, hence the need to adopt stricter policies for their marketing

**Keywords:** Quality, Control, Herbal, Obesity

### **Introduction**

Overweight and obesity are defined as abnormal or excessive accumulation of body fat to a level that represents a health risk, it is certainly linked to genetic components but the change in eating habits and the increase in inactivity through urbanization are the main causes of obesity. The most obvious management of obesity consists of a balanced diet and regular practice of physical activity. Traditional herbal remedies exist and can be divided into several groups including laxatives, lipolytic, appetite suppressants, and diuretics primaries (Bibalani & Mosazadeh-Sayadmahaleh, 2011). Herbal teas based on these plants must be subject to constant quality control, to ensure patient safety.

However, with their popularity and the global market expansion, herbal product safety has become a major public health concern. Regulatory failures and unsafe distribution channels (including Internet sales) can lead to adverse reactions due to the poor quality of these products. The most common causes are falsification, substitution or misidentification, incorrect dosages, interactions with conventional drugs, use of products contaminated with potentially dangerous substances such as microbial metabolites (e.g. mycotoxins),

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radioactive particles, heavy metals, and agrochemical residues (Kosalec et al., 2009). In such a marked context by the increasing use of herbal products by the public, it appears imperative to take the necessary measures to evaluate the health claims of these products, and to control and develop quality and manufacturing standards. The main objective of this study was to evaluate the quality of dieting herbal teas available over the counter in Sidi Bel Abbès Community pharmacies.

## **Materials and Methods**

The study focused on five herbal teas: herbal tea Bio 3, herbal tea Fassa, herbal tea Medicaflor herbal tea Wassilat, and herbal tea Santé vie. These products were obtained in a community pharmacy in Sidi bel Abbes. For each herbal tea, a quantity was crushed and stored in a new paper kraft bag in a dry place at room temperature. The remains of unground herbal teas were kept in their packaging.

### **Control Tests**

Control tests were assessed according to the WHO guidelines for assessing quality of herbal medicine ( world health organization, 2007). Botanical controls of the five herbal teas were carried out through the setting of a visual control sheet, macroscopic and microscopic observation, total ashes determination, maceration, and observation of the extracts by UV light.

#### *Visual Checklist*

Herbal teas were visually inspected in order to discover the signs of a possible counterfeit: defective packaging, bad labeling, and incorrect dosage. A visual checklist form was created for each herbal tea. This form was based on the WHO guidelines for assessing quality of herbal medicine (world health organization, 2007).

#### *Macroscopic Observation*

It is an examination, which is made with the naked eye. It allows us to identify the presence of foreign elements (pebbles, snail shells...), but also foreign parts (stems accompanying the leaves for example). A quantity of each tea was put in a beaker. With the help of a pair of tweezers, we looked for foreign elements. Then, we checked the real presence of plants including the composition by organoleptic characteristics like color, smell, and aspect.

#### *Microscopic Observation*

Powder small quantity of each herbal tea was spread on a slide with a few drops of Gazet du Chatelier reagent. The slide was covered by a coverslip. For microscopic observation, the focus was made with the 10 x lens before switching to the 40xn lens. The characteristic elements were noted and photographed (Baytop, 1956).

#### *Total Ash*

Total ash refers to the total amount of material produced after powder incineration at a temperature of 600 ° C to remove all carbon atoms (organic matter). Two porcelain crucibles were heated for 30 min, cooled in a desiccator, and then weighed. In each crucible, 1.00 g of herbal tea powder was introduced and distributed evenly inside. After drying for 1 h at 100 °C in the oven, the crucibles were incinerated in a muffle furnace at a temperature of 600 °C. After each incineration, the crucibles were placed in a desiccator for cooling and then weighed separately. Incineration was continued until a constant mass was obtained (Leong et al., 2020). The total ash content was calculated according to the following formula:

$$\% \text{ Ash (uncorrected)} = \frac{W3 - W1}{W2} \times 100$$

Where W1 = mass of crucible  
 W2 = mass of sample in grams  
 W3 = mass of ash and crucible in grams

#### *Maceration and Observation under UV Light*

For the maceration process, four solvents were used: sulfuric acid, benzene, methanol and chloroform. Sulfuric acid was diluted by half (50% H<sub>2</sub>SO<sub>4</sub>). Ten ml of each solvent was placed in volumetric flasks and then 0.5 g of herbal tea was added. The mixture was left to cool for about 24 hours and then the resulting solution was filtered. The supernatant was observed by UV light at two wavelengths: 254 nm and 366 nm. (Liang, 2004).

#### *Microbiological Control*

1g of each herbal tea was weighed and introduced into a tube containing 9 ml of sterile physiological water. From the suspension obtained three successive dilutions were carried out: one to the tenth, one to the hundredth and the last one to the thousandth. For each dilution two plating operations were made on petri dishes according to the rake technique, one on Sabouraud medium for the search of fungi and the other on nutrient agar for the search of bacteria. Then incubation was carried out in an oven at 37°C for 48 hours for the medium containing the nutrient agar and at 25°C for five days for the Sabouraud medium. After incubation, the different colonies were counted and the results were expressed in colony forming units per ml. (Adoukpe et al., 2017).

### **Results and Discussion:**

Visual checklist results are summarized in Table 1 and 2.

Table 1. Visual inspection checklist results (part1)

Herbal tea	Sealing and packaging system	Readability information on the packaging	Composition	Leaflet
Bio 3	Hermetically sealed	clear	available	available
Santé vie	Hermetically sealed	clear	available	available
Fass	Hermetically sealed	clear	available	available
Medicaflöre	Hermetically sealed	clear	available	Not available
Wassilat	Hermetically sealed	clear	available	Not available

Table 2. Visual inspection checklist results (part1)

Herbal tea	Indication	Contraindication	Side effects	Mode of use	Shelf life and expiration date
Bio 3	available	available	Not available	available	available
Santé vie	available	Not available	Not available	available	available
Fass	available	available	available	available	Not available
Medicaflöre	available	Not available	Not available	available	available
Wassilat	available	Not available	Not available	available	Not available

Table 1 and 2 show that composition, indications and use mode are mentioned on the five herbal teas. The bio 3, Santé Vie and Fassa herbal teas contain a leaflet unlike Medicaflor and Wassilat herbal teas. Contra-indications were mentioned on the bio 3 and Fassa herbal teas but not on Santé Vie, Medicaflor and Wassilat herbal teas. Shelf life and expiration dates are mentioned on the herbal teas, except for Fassa. According to the European pharmacopoeia, herbal teas must be stored in a dry place and protected from light, the shelf life of the mixture is

that of the drug with the shortest shelf life (Edqm, 2012). Therefore, it appears that the Fassa herbal tea does not meet the standards of the pharmacopoeia. The absence of instructions in the Medicaflor and Wassilat herbal teas would be non-compliant because it should serve as a therapeutic guide. The contraindications are a very important information during the treatment. Therefore, their absence in Medicaflor and Wassilat herbal teas is not conform

### Macroscopic Study

The macroscopic examination showed foreign mineral elements such as pebbles in the herbal teas Fassa, Medicaflor and Wassilat. Some plant parts included in herbal tea composition was also detected: \*Bio 3: leaf and pod of senna (see figure 1) \*Healthy Life: fennel, aroma and lemon peel (see figure 2) \*Fassa: chrysanthellum and cassia alata leaves (see figure 3) \*Medicaflor: globular, rosemary, ash, caraway and mallow (see figure 4). For Wassilat: no plant was identified



Figure 1. Bio 3 herbal tea macroscopic observation



Figure 2. Santé et vie herbal tea macroscopic observation



Figure 3. Fassa herbal tea macroscopic observation



Figure 4. Medicaflor herbal tea macroscopic observation



## Microscopic Study

Microscopic observation has shown the existence of many debris belonging to the plants included in herbal teas composition (see figures 5, 6, 7, 8, 9)

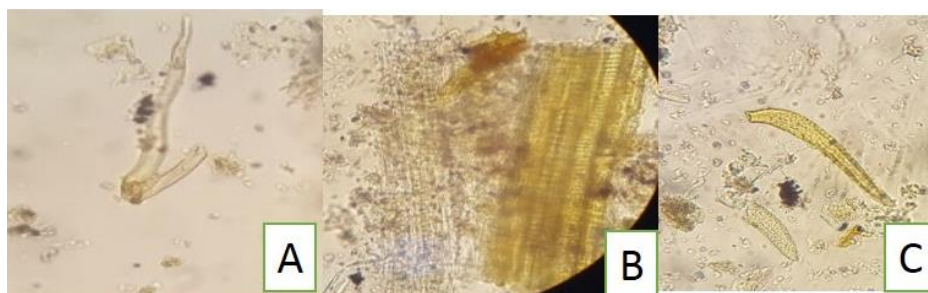


Figure 5. BIO3 herbal tea microscopic observation

A: *Malva sylvestris* trichome, B: *Senna acutifolia* pitted vessels, C: *Senna acutifolia* trichome

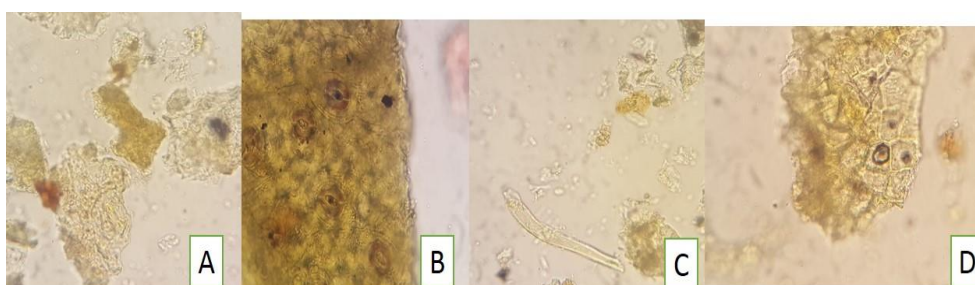


Figure 6. Santé vie herbal tea microscopic observation

A: *Citrus sp* secretory cavities, B: fennel epicarp, C: *Fraxinus sp* trichome, D: *Citrus aurantium* epidermis debris

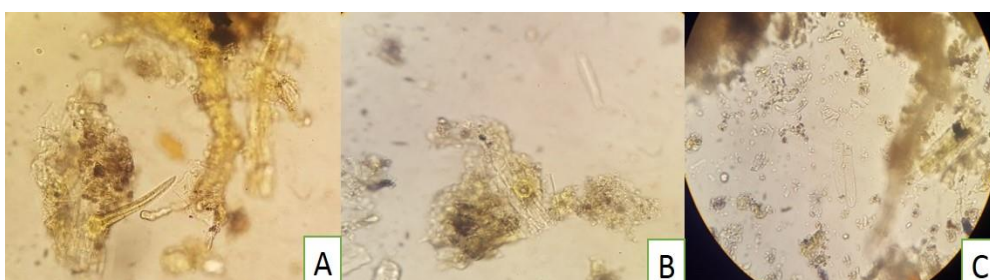


Figure 7. Fass herbal tea microscopic observation

A: *Cassia alata* trichome, B: *Chrysanthellum sp* secretory canal, C: *Chrysanthellum sp* trichome

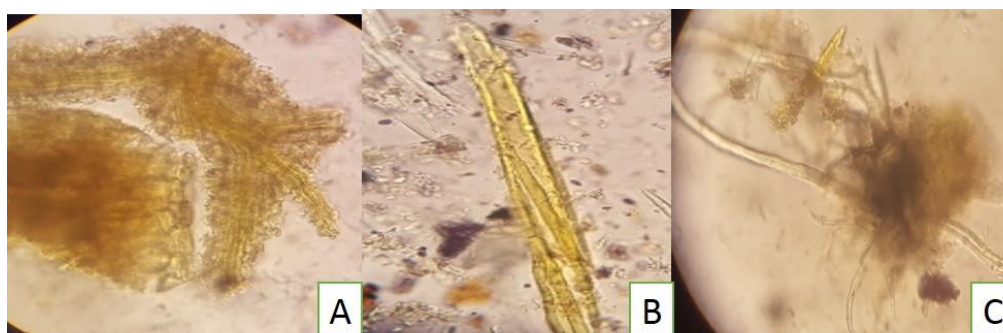


Figure 8. Medicaflor herbal tea microscopic observation

A: *Fraxinus sp* sclereids, B: *Fraxinus sp* gelatinous fibres, C: *Rosmarinus officinalis* trichome

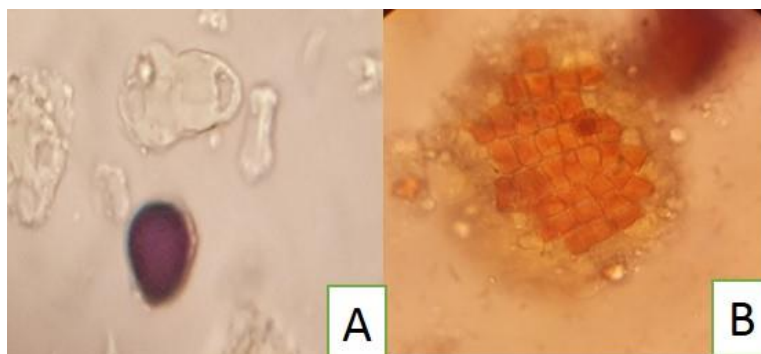


Figure 9. Wassila herbal tea microscopic observation

A: *Artemisia annua* glandular secretory trichomes, B: *Brassica oleracea* parenchyma

According to European pharmacopeia, the identity of each plant present in the herbal tea mixtures must be verified by botanical macroscopic and/or microscopic examination. However, some drugs that appear in the compositions of the herbal teas were not found. According to the same pharmacopeia, herbal tea mixtures should not exceed 10 plants:

- No more than 5 plants considered as active substances, which should represent at least 10% (m/m) of the total mixture
- No more than 3 herbal drugs for flavor improvement with a maximum of 15% (m/m) from the total mixture,
- No more than 2 herbal drugs for appearance improvement with a maximum of 10% (m/m) of the total mixture.
- No information was done about the role of each drug in the five herbal teas. Knowing that, according to the European pharmacopeia, plants used as active substances can be associated between them only if they have identical or complementary medicinal properties and if the herbal teas mode of use (maceration, infusion, decoction) is similar to that of the plant alone, a thing that couldn't be checked especially that there is no information about which drug is used as active substance. It should also be noted that the drug dosage was not indicated on the herbal teas package or leaflet.

### Total Ash Values

Total ashes Values are expressed in Table 3

Herbal tea	Total ashes (pourcentage $\pm$ SD)
Bio 3	6.865 $\pm$ 0.135
Santé vie	6.335 $\pm$ 0.395
Fass	7.19 $\pm$ 1.81
Medicaflore	9.805 $\pm$ 5.045
Wassilat	4.035 $\pm$ 0.915

Table 3 analysis shows that the total ash levels and the standard deviation are quite high in Medicaflor herbal tea, a little high for Fassa herbal tea, average for Bio 3 and santé vie herbal teas, and low for Wassilat herbal tea. Plant carbonization allows the elimination of all organic matter and the residue weighing, containing only mineral materials, gives an indication of the cleanliness degree of the plant as well as the presence of fertilizing agents (Anton, 2003). Since the herbal tea cleanliness degree is related to the level of total ash, it can be said that Medicaflor herbal tea contains more impurities, followed by Fassa herbal tea, Bio 3 herbal tea, Health Life herbal tea, and Wassilat herbal tea. The high levels of total ash are due to the presence of foreign elements of mineral origin such

### Extracts Observation under UV Light

Herbal tea extracts were observed under UV light at two wavelengths: 254 nm and 366 nm. The results are expressed in Tables 4 and 5.

Table 4. Herbal teas benzene and sulfuric acid extract observation

Herbal tea	Benzen			Sulfuric acid		
	daylight	254 nm	366 nm	daylight	254 nm	366 nm
Bio 3	Yellow green	Orange	Orange	Brownish	No fluorescence	No fluorescence
Santé vie	Yellow green	Orange	brick red	Brownish	No fluorescence	No fluorescence
Fassa	Yellow green	Orange	Red	Brownish	No fluorescence	Orange
Medicaflor	Yellow green	Orange	Red	Brownish	No fluorescence	No fluorescence
	colorless	No fluorescence	No fluorescence	purple	No fluorescence	No fluorescence

Table 5. Herbal teas chloroform and methanol extract observation

Herbal tea	Chloroform			Methanol		
	daylight	254 nm	366 nm	daylight	254 nm	366 nm
Bio 3	Yellow green	Yellow	brick red	Yellow green	Yellow	No fluorescence
Santé vie	pale green	Orange	brick red	pale green	Yellow	No fluorescence
Fassa	dark green	Orange	Red	dark green	No fluorescence	No fluorescence
Medicaflor	Yellow green	Orange	Red	Yellow green	Yellow	No fluorescence
Wassilat	colorless	No fluorescence	No fluorescence	colorless	No fluorescence	No fluorescence

There is no fluorescence for sulfuric acid and methanol extract at 254 nm and at 366 nm for all herbal teas. The observation at 254 nm of benzene extract gave an orange color except Wassilat herbal tea where there is no fluorescence. Observation under daylight of sulfuric acid extract gave a brownish color for all the herbal teas except for Wassilat extract which took a purple color. There is no fluorescence for the observation at 366 nm of sulfuric acid for all the herbal teas except for the Fassa tea which took an orange color. There is no fluorescence for all Wassilat herbal tea extracts.

### Microbiological Control

After 48 hours and 5 days of incubation respectively for the search of bacterial and fungal contamination, the colony count was summarized in Table 5. As we can see all the studied herbal teas revealed the presence of bacterial and fungal contamination, the results of the count vary from  $1.2 \times 10^3$  CFU /ml to  $2.5 \times 10^4$  CFU/ml for bacterial contamination and from  $6 \times 10^2$  ufc/ml to  $2.9 \times 10^4$  ufc/ml for fungal contamination. Based on the overall microbial load, it appears that the Bio 3 herbal tea is the most contaminated one; the Wassilat herbal tea is in last position in terms of contamination. The average bacterial and fungal contamination is  $9.8 \times 10^3$  ufc/ml and  $1.2 \times 10^4$  ufc/ml respectively.

Table 5. Microbial load

Herbal tea	Bacterial load (UFC/ml)	Fungal load (UFC/ml)
Bio 3	$2.5 \times 10^4$	$1.63 \times 10^4$
Sante Vie	$9.1 \times 10^3$	$2.9 \times 10^4$
Fassa	$1.3 \times 10^4$	$1.3 \times 10^4$
Medicaflor	$9 \times 10^2$	$2.2 \times 10^3$
Wassilat	$1.2 \times 10^3$	$6 \times 10^2$

Microbiological examination revealed that all the examined herbal teas were contaminated with fungal and bacterial agents. These results are much higher than those of the study of the same type conducted by Derouiche & Abdenour (2017) on herbal teas marketed in pharmaceutical pharmacies in the region of Constantine. It showed that four out of six teas studied or a percentage of 66.67% were contaminated. The presence of a

significant amount of microorganisms in herbal teas can be explained by contamination by dust from the soil, the natural environment of bacteria and molds, or that from manure (Kandeel et al., 2014). According to the WHO, the main sources of contamination include the soil, the transport and storage process, and post-harvest treatments that plant drugs undergo (WHO, 2007). Cross-contamination from foreign equipment that comes in contact with plant drugs is also a possible source of contamination.

## **Conclusion**

Quality control of the five diet herbal teas that was carried out in this work, showed that these herbal teas are subjected to bad conditions of conservation and storage especially as the microbiological controls revealed fungal and bacterial contaminations. The ash tests showed high levels of total ashes, which would indicate the presence of mineral foreign elements in the herbal teas. botanical controls concluded on the fact that certain vegetable drugs were used in these herbal teas without really caring about the contra-indications and the precautions of use.

## **Scientific Ethics Declaration**

The authors declare that the scientific ethical and legal responsibility of this article published in EPHELS journal belongs to the authors.

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**ICMeHeS 2022: International Conference on Medical and Health Sciences**

## **Formulation and Evaluation of a Disinfectant Solution Based on Natural Products**

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**Abstract:** Hands are the main mode of transmission of microorganisms. Hand hygiene is considered the most effective measure of general precautions in the prevention of microbial contamination. The hydroalcoholic solution containing a high concentration of alcohol can cause a burning sensation and marginal irritation of the skin. This is precisely the main reason for the need for a disinfectant solution but which does not have the disadvantages of the hydroalcoholic solution and it is the objective of our end-of-studies dissertation which is the formulation of a disinfectant solution based on essential oils by comparing its effectiveness with the hydroalcoholic solution. In order to measure the antibacterial effect, we performed the aromagram technique on the hydroalcoholic solution as well as on ours based on essential oils, the effect of which is assessed by measuring the diameter of an area of inhibition. The result obtained allowed us to confirm that the hydroalcoholic solution is effective but it causes skin irritation, while our natural solution has proven to be very interesting for its antibacterial power and its moisturizing effect with aloe Vera.

**Keywords:** Hygiene, Antibacterial, Microorganism, Hydroalcoholic, Essential oils.

### **Introduction**

Hand hygiene is one of the elements of daily hygiene. From an anatomical point of view, the hands are the gripping tool of Man and serve him to interact with his environment. This external environment is populated by bacterial or viral flora, but also by dirt and toxic elements. Having come into contact with and colonized by these agents, the hands participate in conveying these elements. With the spread of the COVID 19 pandemic since 2019, several manufacturers, in collaboration with researchers, have moved towards the marketing of adequate means of protection to fight against possible contamination.

The optimal practice of hand hygiene, whether by conventional washing with water and medical soap or not, or by hydro alcoholic friction, remains the first measure of prevention of these infections (Pittet et al.). Unfortunately, people's compliance with this multi-daily gesture is very low, rarely exceeding 50%, mainly due to the dryness and irritation of the skin caused by the frequent use of SHA (Kampf et al., 2007).

Germ on the hands are divided into two groups: resident flora and transient flora. The resident flora consists of micro-organisms permanently anchored in the superficial layers of the skin. This bacterial flora varies qualitatively and quantitatively from one site to another in the same individual as well as from one individual to another. It renews itself regularly and is rarely the cause of infections. (Clin, 2001). The transient flora is most often composed of saprophytic bacteria, from the environment and sometimes of pathogenic bacteria from the commensal flora of treated patients. This flora is the main cause of cross infections. It is made up of Gram-

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negative bacteria (Enterobacteriaceae, Pseudomonas, etc.) and Gram-positive bacteria (Staphylococcus aureus, Streptococcus) (Errouane et al., 2016). Essential oils are defined as volatile and fragrant extracts, which are extracted from certain plants by steam distillation, pressing or incision of the plants they contain (Bruneton, 1999).

The mechanisms by which essential oils exert their antibacterial activity are poorly understood. Due to the complexity of their chemical composition, it is difficult to give a precise idea of the mode of action of EOs. It is likely that their antibacterial activity is not attributable to a single mechanism, but to multiple sites of action at the cellular level (Dorman, 2000).

Burt argued that the important characteristic of essential oils is attributed to the hydrophobicity of some of these components which allows them to easily cross the phospholipid bilayer of the cell membrane by altering its permeability and causing abnormal losses of ions, even macromolecules (Burt, 2004).

Table1. Essential oils

Essential oils	N	Mean
	Melaleuca alternifolia	Broad spectrum antibacterial, Antifungal, Antiviral, pest control
Clou de girofle (Clove)	Syzygium aromaticum, Eugenia caryophyllata	Antibacterial, antiviral, antifungal and antiparasitic, Cauterizing, Stomachic, Anesthetic, Antiseptic
Eucalyptus radié	Eucalyptus radiata	Antibacterial and antiviral stimulates the immune system
Ravintsara	Cinnamomum camphora cineoliferum	Antiviral, Antibacterial

## Method

### Microbiological Analysis of Essential Oils

The study of the antibacterial power of essential oils is carried out by the method of aromagrams on a Petri dish in order to confirm the antiseptic power of the selected essential oils. The first step consists of soaking the absorbent pads directly with the essential oil extracts and placing them on the culture medium: Muller Hinton. The bacterial strains used are: Escherichia coli, Staphylococcus aureus ATCC, Staphylococcus aureus MRSA, Pseudomonas aeruginosa, Klebsiella pneumonia, Enterococcus faecium, Enterococcus faecium.

### Formulation

Nine formulas have been developed and are summarized in the table below:

Table 2. Formulas

Ingredients	F1	F2	F3	F4	F5	F6	F7	F8	F9
Arbre a the	0,5%	/	/	/	0,25%		0,125	0,5%	/
Clou de girofle	/	0,5%	/	/	/	0,25%	0,125%	0,5%	/
Eucalyptus	/	/	0,5%	/	/	0,25%	0,125%	0,5%	/
Ravintsara				0,5%	0,25%	/	0,125%	0,5%	/
Alcohol								35%	84%
Distilled water	89,5%	89,5%	89,5%	89,5%	89,5%	89,5%	89,5%	50%	9,5%
Aloe Vera	5%	5%	5%	5%	5%	5%	5%	5%	/
Solubilizing	5%	5%	5%	5%	5%	5%	5%	8%	/
Glycerol	/	/	/	/	/	/	/	/	1,5%
H2O2	/	/	/	/	/	/	/	/	5%

The same protocol was used for the preparation of the different formulas. Initially, mixture of aqueous excipients, then solubilization of essential oils, finally, mixing of the two solutions and filtration.

### Characterization and Controls

All the solutions prepared have been checked on the physico-chemical and microbiological level. Organoleptic properties are determined by examining: color, appearance, clarity, homogeneity. The pH, the density as well as the refractive index were also measured. Stability tests were performed using centrifugation. A volume of 50 ml of each solution is introduced into an appropriate tube and subjected to ultracentrifugation for 3 minutes at 18000 rpm. The antiseptic and disinfectant activity of all the formulas prepared was evaluated by microbiological control using the following bacterial strains: *Escherichia coli*, *Staphylococcus aureus* ATCC, *Staphylococcus aureus* MRSA, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Enterococcus faecium*, *Enterococcus faecalis*.

Inoculation of the suspension on Mueller Hinton agar for 18 to 24 hours at 37°C. The evaluation of the antibacterial activity is carried out by aromagrams. The method is based on the diffusion of antiseptic solutions formulated in Mueller Hinton medium in a petri dish in contact with the bacterial strain. The effect is assessed by measuring an inhibition zone, and as a function of an inhibition diameter.

## Results and Discussion

The result of the organoleptic examination of all the solutions prepared revealed clear, homogeneous solutions with a characteristic odor of each essential oil. The density value was between 0.80 and 1 and the pH value at 6. The refractive index averaged 1.35.

### Microbiological Analysis

The result of the antibacterial activity of essential oils is summarized in Table 3. Essential oils have a broad spectrum of activity against microbial strains, except for *Pseudomonas aeruginosa* which has developed resistance against Clove, Eucalyptus, and Ravintsara extracts and has given poor results, while that in the case of tea tree, it fully inhibited the development of *Pseudomonas aeruginosa* and gave positive results for all strains. This is why the four essential oils should be combined to guarantee good antibacterial activity.

Table 3. Antibacterial activity of essential oils

Essential oils Strains	Arbre à thé	Clou de girofle	Eucalyptus	Ravintsara
<i>Escherichia coli</i>	+++	+++	+++	+++
<i>Staphylococcus aureus</i> ATCC	+++	+++	+++	+++
<i>Staphylococcus aureus</i> MRSA	+++	++	++	+
<i>Pseudomonas aeruginosa</i>	+++	-	-	-
<i>Klebsiella pneumoniae</i>	+++	+++	+	+++
<i>Enterococcus faecium</i>	+++	+++	+	+
<i>Enterococcus faecalis</i>	+++	++	+++	+++

The result of the antibacterial activity of essential oils is summarized in Table 4.

Table 3. Antibacterial activity of formulas

Strains	Formulas								
	F1	F2	F3	F4	F5	F6	F7	F8	F9
<i>Escherichia coli</i>	-	-	-	-	-	-	-	++	+++
<i>Staphylococcus aureus</i> ATCC	-	-	-	-	-	-	-	++	+++
<i>Staphylococcus aureus</i> MRSA	-	-	-	-	-	-	-	+++	++
<i>Pseudomonas aeruginosa</i>	-	-	-	-	-	-	-	+	+
<i>Klebsiella pneumoniae</i>	-	-	-	-	-	-	-	+	++
<i>Enterococcus faecium</i>	-	-	-	-	-	-	-	++	++
<i>Enterococcus faecalis</i>	-	-	-	-	-	-	-	+	+



The results obtained in this second step demonstrate that the first seven formulas did not inhibit the development of bacteria, and gave negative results against all bacteria, due to the fact that they are diluted and contain low concentrations of essential oils at 0.5%. While in the case of the eighth formula which contains four essential oils with a concentration of 2%, associated with 35% alcohol, has a broad spectrum of antibacterial activity, and it is more active and more marked against gram positive bacteria such as *Staphylococcus aureus*.

For other bacterial strains, its activity is similar to the ninth formula which is the reference solution recommended by the WHO, we have found that the zone of inhibition is almost the same for gram negative bacteria such as *Escherichia coli*, and gram-positive Cocci such as *Enterococcus*, so we can conclude that the combination of essential oils with alcohol has produced good results.

## Conclusion

Antiseptics are pharmaceutical products for external use with an essential role in the prevention and fight against infections. Their proper use can in some cases limit the use of antibiotics and limit the spread of resistant microbial strains, which poses a serious public health problem.

Dilutions of essential oils at 0.5% have not shown great antibacterial efficacy knowing that the threshold not to be exceeded for an essential oil solution for dermal use must be less than 2%. Secondly we made 4 other solutions including the 8th formula which was 2% essential oils with 35% alcohol, fully inhibited the development of bacteria, and gave positive results for all physicochemical controls with a pH around 6 which is ideal for dermal use.

## Recommendations

In order to promote the formulation of disinfectant based on natural products, it is interesting to carry out more tests in order to optimize the quantities of essential oils in the formula and this in order to avoid the use of alcohol in order to increase the antibacterial effect.

## Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPHELS journal belongs to the authors.

## Acknowledgements or Notes

\* This article was presented as an oral presentation at the International Conference on Medical and Health Sciences ( [www.icmehes.net](http://www.icmehes.net) ) held in Antalya/Turkey on November 17-20, 2022.

\* These works have made it possible to promote natural products and to study the possibility of formulating a disinfectant based on essential oils and to evaluate their effectiveness alone and in formulation.

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ICMeHeS 2022: International Conference on Medical and Health Sciences

## Variants of Modern Treatment of Patients with Chronic Hemorrhoids

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**Abstract:** Hemorrhoids are one of the most widespread diseases of the adult population in industrialized countries. It has been established that in people over 40 years of age, the symptoms of hemorrhoids are found in 60-70% of cases. The share of hemorrhoids, in the structure of coloproctological diseases, accounts for about 40%. In recent years, minimally invasive methods of treating hemorrhoids have already been firmly introduced into the daily practice of coloproctologists. The advantages of these methods over surgical interventions are the possibility of their use on an outpatient basis, without disability; high efficiency in the initial stages of the disease; a small number of complications. The most commonly used minimally invasive methods are: hardware ligation of hemorrhoids with latex rings, sclerotherapy, infrared photocoagulation of hemorrhoids, suture ligation of hemorrhoidal arteries under the control of dopplerometry, electrocoagulation of hemorrhoids. The indication for minimally invasive surgical interventions is uncomplicated internal hemorrhoids I - III stages. When choosing a method for treating patients with hemorrhoids, it is advisable to use a classification that divides chronic hemorrhoids into stage IV. Contraindications include: a combination of hemorrhoids with an anal fissure, rectal fistula, inflammatory diseases of the anal canal and perineum, acute hemorrhoids. Ligation of hemorrhoids with latex rings is the most frequently used technique (30-80%), and sclerotherapy, due to the frequent development of complications (10-45%), is used less and less. Other methods of minimally invasive treatment are used in less than 5% of cases.

**Keywords:** Hemorrhoids, Variants, Modern, Treatment.

### Introduction

Hemorrhoids are one of the most widespread diseases of the adult population in industrialized countries. It has been established that in people over 40 years of age, the symptoms of hemorrhoids are found in 60-70% of cases. The share of hemorrhoids, in the structure of coloproctological diseases, accounts for about 40%. In recent years, minimally invasive methods of treating hemorrhoids have already been firmly introduced into the daily practice of coloproctologists. The advantages of these methods over surgical interventions are the possibility of their use on an outpatient basis, without disability; high efficiency in the initial stages of the disease; a small number of complications.

The most commonly used minimally invasive methods are:

- Hardware ligation of hemorrhoids with latex rings,
- Sclerotherapy,
- Infrared photocoagulation of hemorrhoids,
- Suture ligation of hemorrhoidal arteries under the control of dopplerometry,
- Electrocoagulation of hemorrhoids.

The indication for minimally invasive surgical interventions is uncomplicated internal hemorrhoids I - III stages. When choosing a method for treating patients with hemorrhoids, it is advisable to use a classification that divides chronic hemorrhoids into stage IV.

I. St. Isolation of scarlet blood from the anus without prolapse of hemorrhoids.

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II. St. Prolapse of hemorrhoids with self-reduction into the anal canal (with or without bleeding).

III. St. Periodic prolapse of hemorrhoids and the need for manual reduction into the anal canal (with or without bleeding).

IV. St. Constant prolapse of hemorrhoids along with the rectal mucous, the impossibility of their reduction into the anal canal using manual tools (with or without bleeding).

Contraindications include: a combination of hemorrhoids with an anal fissure, rectal fistula, inflammatory diseases of the anal canal and perineum, acute hemorrhoids.

## **Method**

Ligation of hemorrhoids with latex rings is the most frequently used technique (35-80%), and sclerotherapy, due to the frequent development of complications (10-45%), is used less and less. Other methods of minimally invasive treatment are used in less than 5% of cases. For the first time he developed and used the Blaisdell instrument for applying circular latex ligature on the leg of the hemorrhoidal node Blaisdell in 1954. For the first time he developed and used the Blaisdell instrument for applying circular latex ligature on the leg of the hemorrhoidal node Blaisdell in 1954. Subsequently, other, more advanced ligator models were developed. The use of this method is indicated for internal hemorrhoids II, sometimes III century.

Contraindications for ligation of hemorrhoids are: Combination of internal hemorrhoids with anal fissure and rectal fistula; acute hemorrhoids; inflammatory diseases of the anal canal; anticoagulant treatment. Direct ligation (clamping) of hemorrhoids occurs using a latex ring with an inner diameter of 1 mm, which has good elasticity and provides uniform, constant compression of tissues. Rejection of the hemorrhoid together with the ligature occurs 5 to 9 days after the manipulation. During this period, as a rule, there is a slight discharge of scarlet blood from the anal canal, which does not require the appointment of medications, since it is stopped on its own. In place of the torn off hemorrhoid, a connective tissue scar is formed. There are two main methods for ligating hemorrhoids. The first is based on the retraction of the cavernous tissue into the sleeve of a mechanical ligator using a special soft clamp, after which one or two ligatures are dropped from the instrument onto the leg of the hemorrhoid. The ring should squeeze only the leg of the node, not grasping the tissues located below the anorectal line.

The essence of the second technique is the use of a vacuum ligator, which is connected to the suction. The working part of the instrument should be tightly pressed against the hemorrhoid. After switching on the suction, negative pressure is created in the cylinder of the device, and the assembly is gradually drawn into the ligator sleeve. When a pressure of 0.7 - 0.8 atmospheres is reached, two latex rings are dropped from the instrument onto the leg of the hemorrhoid. During the first session, one or two hemorrhoids are ligated. The next stage of treatment is prescribed no earlier than 15 days later. With proper adherence to the technique, the patient should not experience severe pain. After manipulation, slight soreness, a feeling of pressure, a feeling of a foreign body in the rectum, tenesmus, which can persist for 1 to 2 days, may appear. These sensations are stopped by taking non-narcotic analgesics.

Complications of ligation of hemorrhoids are: pain syndrome (observed if the manipulation is performed incorrectly), thrombosis of external hemorrhoids (occurs in 2-3% of patients), bleeding (observed in 1% of patients). The effectiveness of the technique is over 80%. Suture ligation of hemorrhoidal arteries under the control of ultrasound Doppler. A relatively new minimally invasive technique, which has not yet become widespread in our service market, is suture ligation of hemorrhoidal arteries under the control of Doppler ultrasound. This method attracts by the ease of implementation and targeted impact on the etiological factor in the development of hemorrhoids.

The method is based on the identification of hemorrhoidal arteries using ultrasound (US) Dopplerometry, followed by suturing and ligating them with a regular thread. This method was developed and proposed by the Japanese surgeon Morigana (1996). For diagnostic dopplerometry, an ultrasonic surgical device with a sound transducer and an anoscope with an ultrasonic sensor mounted in it are used. After installing this sensor above the hemorrhoidal artery, a light and sound signal is heard on the device. Through the incisure in the anoscope, over the internal hemorrhoidal node, the distal branch of the hemorrhoidal artery is sutured and ligated with an eight-shaped suture. The criterion for correct ligation of the artery is the disappearance of sound and light signals. In the same way, hemorrhoidal arteries are ligated along the entire circumference of the rectum. This leads to the interruption of the excess blood supply to the internal hemorrhoids and their fixation in the anal canal. This technique is most effective in stage I-III hemorrhoids. Contraindications are external hemorrhoids,

thrombosis of hemorrhoids, inflammatory diseases of the anal canal, combination with paraproctitis and anal fissure.

A small number of complications include a short-term urinary retention, a feeling of discomfort in the anal canal for 2-3 days after the procedure. However, it should be remembered that with excessive tightening of the ligature, the hemorrhoidal artery may erupt with the development of massive arterial bleeding. To prevent delayed arterial bleeding, it is advisable to suture no more than 2 hemorrhoidal arteries in one session. Subsequent sessions are held 2 weeks after the first procedure. Suture ligation of hemorrhoidal arteries under the control of ultrasound dopplerometry may be a promising minimally invasive method for treating hemorrhoids. However, to assess the effectiveness of this method, as well as other techniques, it is necessary to study the long-term results of treatment.

**Surgery:** At present in the world, the most common method of treating hemorrhoids is hemorrhoidectomy. Most coloproctologists and surgeons in our country use a technique aimed at excision of the main collectors of cavernous tissue, proposed by Milligan and Morgan (1937). This operation is used in two modifications. Some doctors use closed hemorrhoidectomy, when after excision of the hemorrhoid, stitching and ligation of the vascular pedicle, the mucous membrane is sutured tightly. Other coloproctologies use an open technique, without restoring the integrity of the rectal mucosa, leaving a whole mucocutaneous tissue strip between the excised hemorrhoids. Each modification has its own advantages and disadvantages. In connection with the development of new technologies and the development of modern devices, they began to be used when performing hemorrhoidectomy, in order to reduce the number of postoperative complications and shorten the rehabilitation period for patients after the operation. The most commonly used are the ultrasonic harmonic scalpel, the LigaSure electrothermal system, and the radio wave scalpel. In recent years, the method of circular resection of a portion of the mucous-submucosal layer of the distal rectum using a circular stapler (Longo's method) has become widespread.

Designed for bipolar electrocautery and vessel transection, the LigaSure electrothermal system delivers controlled energy to the clamping jaws. As a result, collagen and elastin are denatured in the tissues with the formation of a zone of coagulation necrosis. In addition, the tissue is mechanically squeezed with a clamp, to which an electric current is dosed. The strength of the affected area, consisting of partially denatured protein, is comparable to the strength of the sewn fabric. In this regard, there is no need for isolation and additional ligation of the vascular pedicle of the hemorrhoid. The whole process takes about 5 seconds. The device allows to coagulate vessels up to 7mm in diameter. The depth of thermal effect on the fabric, according to the characteristics, is 2mm. The LigaSure electrothermal system allows hemorrhoidectomy to be performed virtually bloodless without the use of suture material. At the same time, the operation time is significantly reduced. However, in some patients, in the immediate postoperative period, a rather intense pain reaction develops, which may be associated with a deep thermal effect on the tissues of the anal canal. In this regard, this device, in our opinion, is most expedient to use for hemorrhoidectomy of large hemorrhoids.

## **Results and Discussion**

The modern possibilities of surgical treatment of patients with chronic hemorrhoids are significant. The arsenal of methods for influencing this common disease is great. It is impossible to adapt any one method of treatment available in the clinic to all stages of hemorrhoids. It is necessary to skillfully determine the indications for treatment and, depending on the stage of the disease, choose the most appropriate method. It should be remembered that minimally invasive methods of treatment, which patients readily agree to, especially those used on an outpatient basis, are most effective in the initial stages of hemorrhoids. With an increase in the staging of the disease, as well as with a combination of hemorrhoids with other diseases of the anal canal and pararectal tissue, surgical treatment is indicated.

The accumulated personal experience of using various minimally invasive techniques, observation of patients and analysis of long-term results of treatment of such patients showed that these techniques are most effective in the initial stages of hemorrhoids. At IV and III stages of the disease, it is advisable to use an operative method of treatment. Minimally invasive techniques in late stages of hemorrhoids can be used to stop hemorrhoidal bleeding, which can be the first stage of further radical treatment of such patients, as well as in elderly, somatically burdened patients with a palliative purpose. In our opinion, no more than 10-15% of patients diagnosed with chronic hemorrhoids can be radically cured using minimally invasive methods. However, a combination of different methods allows you to expand the indications for their use. Undoubtedly, the positive side of minimally invasive techniques is the ease of use, a small number of complications, low trauma, good

tolerability of the procedure, the possibility of using them on an outpatient basis, which is economically beneficial in modern conditions of insurance medicine.

## **Conclusion**

In our opinion, no more than 10-15% of patients diagnosed with chronic hemorrhoids can be radically cured using minimally invasive methods. However, a combination of different methods allows you to expand the indications for their use. Undoubtedly, the positive side of minimally invasive techniques is the ease of use, a small number of complications, low trauma, good tolerance of the procedure, the possibility of using them on an outpatient basis, which is economically beneficial in modern conditions of insurance medicine.

## **Recommendations**

It is recommended to use the available data in the treatment program in patients with chronic hemorrhoids.

## **Scientific Ethics Declaration**

The author declares that the scientific ethical and legal responsibility of this article published in EPHELS journal belongs to the author.

## **Acknowledgements or Notes**

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**ICMeHeS 2022: International Conference on Medical and Health Sciences**

## **Intracardiac Thrombi as a New Variant Cardiovascular Injury in a Previously Healthy COVID-19 Child: Case Report and Follow Up**

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Meshalkin's National Research Center

**Abstract:** However, with the onset of the second COVID-19 pandemic wave, single cases of acute thrombotic complications in previously healthy children began to appear. Here we describe the patient with COVID-19 time related acute intracardiac thrombus in a previously healthy 6 year old girl. The treatment according to the national pediatric protocol, included low-molecular weight heparin infusion, high-dose aspirin, methylprednisolone, and intravenous immunoglobulin was lead to dissolving without cardiac surgery. A follow up after 12 months from discharge demonstrated: physical exam, ECG, echocardiography are all normal. Our case presentation shows, that all health care providers must be informed about the full range of complications and even a mild onset of COVID-19 in children.

**Keywords:** Intracardiac thrombi, COVID-19, Children

### **Introduction**

Pediatric multisystem inflammatory syndrome is the most well-known variant of cardiovascular involvement (CVI) COVID-19 in children with an estimated incidence of approximately 0.2%-0.6% among pediatric SARS-CoV-2 infections. Along with this, myocarditis, pulmonary hypertension and cardiac arrhythmias have reported as types of heart injury. However, with the onset of the second pandemic wave, single cases of acute thrombotic complications in previously healthy children began to appear.

### **Method**

Here we describe the patient with COVID-19 time related acute intracardiac thrombus.

### **Results and Discussion**

A previously healthy 6-year old girl of Caucasian ethnicity, admitted to the Cardiology Department of a Pediatric Hospital with a fever (40,0°C), tachycardia (PR 135), and severe headache two weeks after SARS-CoV-2 PCR positive acute respiratory infection. Past medical history of the patient revealed no evidence of heart disease or coagulopathy. On the day of admission, ECG-sinus tachycardia, echocardiography showed LVEF of 67%, mild RA enlargement and homogenous mass in RA 1,68x1,68x1,9 sm large. MRT confirmed right atrial thrombus without flotation (Figure 1).

The treatment according to the national pediatric protocol, included low-molecular weight heparin infusion, high-dose aspirin, methylprednisolone, and intravenous immunoglobulin was started. With treatment, her condition improved and the thrombus started dissolving without cardiac surgery. The patient was discharged

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from the hospital with a recommendation of long-term anticoagulant therapy with apixaban. After one month a follow up showed: hetrogenous masses reduced 1,3x0,74 sm large (Figure 2).

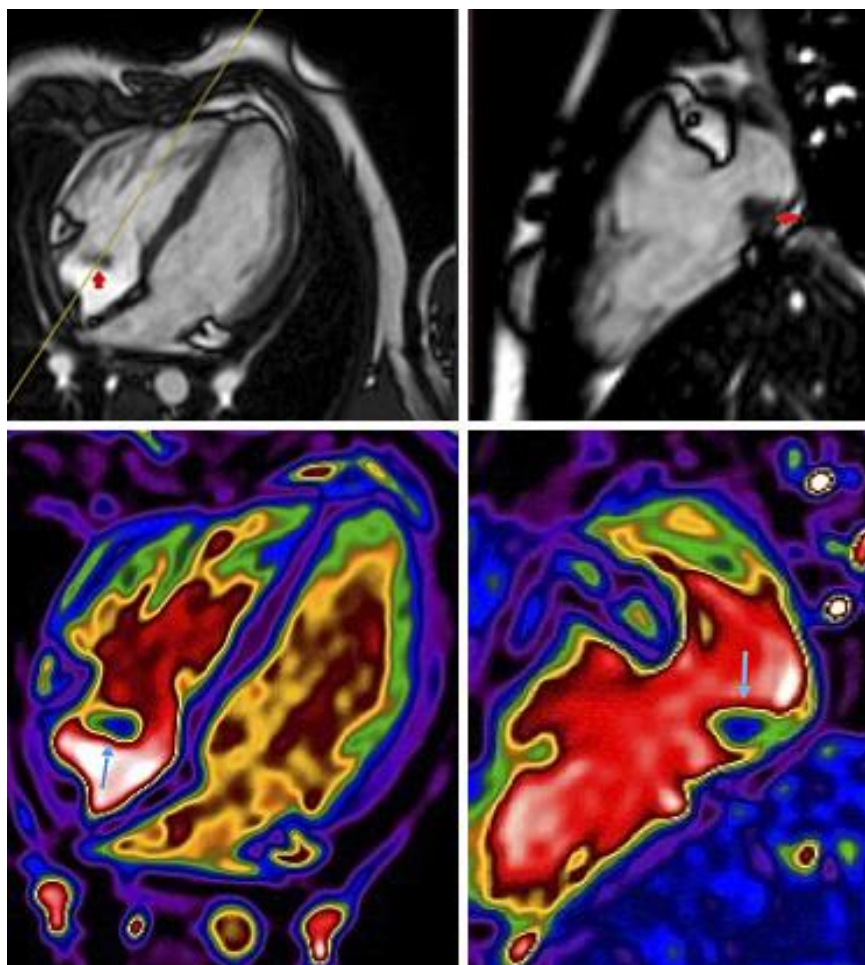


Figure 1. MRI showing the immobile thrombus attached to the anterior right atrium wall



Figure 2. Echocardiography 1 month follow up had showing the size and density echogenic mass reduction



The three month follow up showed: no intracardiac echogenic mass visualized on transthoracic echocardiography. A follow up after 12 months from discharge demonstrated: physical exam, ECG, echocardiography are all normal (Table 1).

Table 1. Biomarkers regarding inflammation, coagulation, and cardiac injury

	Day 1	Day10	1 Month	3 Month
WCC (×10 <sup>9</sup> )	7.2	14.0	7.1	5.9
Lymphocytes (×10 <sup>9</sup> )	4.3	10.0	15.9	20.0
Hemoglobin (g/L)	97	115	126	127
Platelets (×10 <sup>9</sup> )	680	497	206	223
Fibrinogen (g/L)	N/A	3.0	N/A	N/A
D-dimers (ng/mL)	N/A	166.4	0,55	N/A
INR (ratio)	1.3	1.0	1.23	N/A
APTT (sec)	45.0	24.2	15.9	N/A
Pro-BNP (ng/L)	120,1	22,7	2,2	N/A
Troponin T (ng/L)	N/A	249	N/A	N/A
CRP (mg/L)	265	75.3	3,2	2
Procalcitonin (µg/L)	<100	<100	N/A	N/A

## Conclusion

SARS-CoV-2 pathogenetic mechanisms in are still to be researched and the risk factors of CVI in children are unknown. Our case presentation clearly shows, that all health care providers must be informed about the full range of complications and even a mild onset of COVID-19 in children. Acute thrombotic complications, are probably, completely reversible conditions in previously healthy children. The systematic follow-up of pediatric COVID-19 patients, prospective cohort studies, ideally, prospective randomized controlled trials can aid us in our ability to stratify the risk and find potential therapeutic approaches.

## Scientific Ethics Declaration

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## Acknowledgements or Notes

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