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International Journal of Advances in Science, Engineering and Technology (IJASEAT)

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AN EXPLORATION STUDY OF FAMILY FUNCTIONING, PARENTCHILD RELATIONSHIP, AND ONLINE GAME ADDICTION AMONG MALAYSIAN YOUNG ADOLESCENTS

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ABSTRACT

This research aims to understand better the Malaysian young adolescents' online gaming profiles (i.e., family environment, lifestyles, and gaming habits) and explore parents' views and challenges in dealing with online gaming in their children's lives. The research is a cross-sectional quantitative questionnaire survey among 373 youth of varying ethnicity, aged 10-14 years, to characterize Malaysian youth's gaming profile, lifestyles, gaming usage, and behaviours. The contributors for the quantitative questionnaire survey comprised 199 male and 174 female students from public schools (64.1%), private schools (29.8%), International schools (4.3%), and home-schooled (1.9%). The survey was presented online, via various social media using Qualtrics digital survey platform, and in the more old-fashioned —pencil and paper format. Multi-player (MMORPGs) games were reported as the most common, with relaxing and releasing stress the most common motivations given. Various gadgets are used to play online and offline games, with a high percentage of youths acquiring their first digital —gadgets at an early age (7-9). Males spent a much higher percentage of time gaming online than females. The results show a correlation between the family quality of life, particularly mother-child relationships, and the level of gaming addiction in adolescents. The study result shows that higher satisfaction in a mother-child relationship is associated with a higher risk of online gaming addiction among young adolescents. The strengths of this research program lie in the importance of its focus on the topical, growing modern digital gaming phenomena and there being little prior work on this in Malaysia. The information from the present study has its potential to contribute useful insights for policy-makers and mental health practitioners around optimizing the benefits of these technologies, plus dealing with the downsides when gaming usage can become problematic and addictive.

Keywords - Family functioning, parent-child relationship, online game addiction, Malaysian young adolescent

I. INTRODUCTION

Malaysia Communications and Multimedia Commission (MCMC) in 2020 reported that Internet addiction among Malaysians had reached an alarming rate. Malaysian parents are becoming aware of their children's obsession to gameplay and voice concerned that their children's online life was interfering with their home and school obligations and that their children choose computer time over basic social activities. Online game addicts are not addicted to the Internet; instead, they heavily use the Internet as a vehicle to feed their gaming addiction (Pontes & Griffiths, 2014).

The use of the Internet is more prevalent in every household during the Covid-19 pandemic lockdown as daily school-learnings are conducted online. Adolescents are regularly staying active online to stay connected with their friends. Hence, detecting an online gaming addiction is challenging because the

increasing use of the Internet can be masked by realistic and practical use for schoolwork and need to stay connected with family members and friends (Young, 2009).

Without doubt, internet gaming problem is severe and is considered as a psychiatric disorder, which strongly calls for scientific studies on online gaming addiction. Combing through the works of literature, the study on the prevalence of online gaming addiction, specifically on adolescents is limited. Nonetheless, within the limited survey findings, prevalence estimations for adolescents with online game addiction across Western and non-Western countries ranges from 1.6% and 28.6%. To date, there was no study found on the prevalence of online gaming addiction among Malaysian adolescents within the age range 10 to 14 years old. Local studies on prevalence tended to focus on secondary schoolgoing adolescents (Hashim, Kaur & Ng, 2016). The findings of the prevalence of online gaming addiction in adolescents meant there is a pressing need to understand better online gaming activities in the adolescents' world.

Online gaming may be more problematic than offline gaming because 'at risk' individuals may experience more difficulties in overcoming gaming addiction as compared to offline gamers (Griffiths & Meredith, 2009). Given that adolescents are the higher at-risk age group to online gaming addiction and are the most enthusiastic technology adapter, this paper hopes to gather a good understanding of the profile and environment of this group. This paper will also explore the family environment of the youth as the family is the primary unit socialization for adolescents. The findings from the study could benefit the Governmental bodies, professional mental health practitioners, and school counsellors to use as a guide to tailor a more culturally and relatable prevention programs to support healthy gaming lifestyles among Malaysian young adolescents

II. METHODOLOGY

This research will employ sequential explanatory mixed methods to collect data. The design of this study will be carried out in two phases. Phase 1 is a quantitative study to obtain an understanding of the sample profile and online gaming activities. In phase 2, a qualitative study via interviews will be conducted aimed to explore the family environment, parental experiences, and areas for improvement to curb, prevent and reduce the level of online gaming addiction among adolescents.

A sample size of 389 was an acceptable sample for the study following the sample size formula. The acceptable error level would be 5% and 95% confidence level with an estimated 50% response distribution outcome. A total of 500 physical copy of the surveys were handed out to education institutions (Governmental and private), and an online survey was also made available to the public via the Qualtrics platform. This study used a convenient sampling technique. A total of 410 responds (paper and pen, n=352, online, n=58) were collected. The final sample size of n=373 was collected, with 329 participants from paper and pen survey and 44 respondents from the online survey. The researcher rejected 37 surveys (paper and pen, n=23, online, n=14) that are found with errors made by participants during the filling up of the surveys, including incomplete forms, double entries, and participants reported never having played online games.

2.1. Instruments (Assessment tools)

Instruments used for data collection includes Demographic Questionnaires, Family Functioning (AGPAR), Family Quality of Life, Parent-Child Relationship (PACHIQ-R); and Game Addiction Scale for Adolescents.

2.2. Demographic Questionnaires

We collected participants' sociodemographic details, namely, gender, age, ethnicity, and religion. Other

Other information gathered also include, school experience (e.g. relationship with teachers and friends, academic enjoyment) and gaming experience (e.g. gaming hours, type of online games played).

2.3. Family Functioning Index (APGAR)

The Family Functioning Index (APGAR) is to measure the level of satisfaction with various family functions. Developed by Smilksten (1978), the measure consists of five parameters of family functioning: Adaptability, Partnership, Growth, Affection, and Resolve. (The acronym "APGAR" is comprised of the first letter of each parameter.) The response options were designed to describe the frequency of feeling satisfied with each parameter on a 5-point scale ranging from 1 (hardly ever) to 5 (almost always). The higher score indicates greater satisfaction with family function. This is a self-reported questionnaire, which takes less than 5 minutes to complete. The internal reliability of the scale and subscale in the original study ranged from .80 and .85 and validity of .64 (Smilkstein, 1978).

2.4. Parent-Child Relationship (PACHIQ-Child version)

The PACHIQ-Child version aim is to assess how children evaluate their relationship with their parents, namely focusing on conflict resolution (behaviour) and acceptance (feelings). This self-reported 42-items were designed using Likert-scale ranging from 'Always' to 'Never' to assess how the children evaluate their relationship with the parents. 21 items assess the child's satisfaction on his or her relationship with the father, and another 21-items evaluating the mother-child relationship. The internal reliability of the scale and subscale of this study is .78 to .95 and validity of .70 (Lange, Evers, Jansen, & Dolan, 2002)

2.5. Game Addiction Scale (GAS-A)

GAS-A was developed by Lemmens et al. (2009) to measure computer and video game addiction for adolescents. There are 21-item questions, with each question measuring the seven items of DSM-based gaming addiction criteria, salience, tolerance, mood modification, relapse, withdrawal, conflict, and problems. Each statement is scored on a 5-point Likert scale (1, never, to 5, very often). The higher the score indicates, the more likely the person is addicted to gaming. The GAS-A has good construct validity and high reliability. The 21-items showed strong internal reliability with a Cronbach's α value of .94 and .92 in the scale and subscale of this study (Lemmens et al. 2009).

2.6 Procedures

In May 2019, Monash University Human Research Ethics Committee (MUHREC approval code - 189657) provided the ethical approval for the study. The survey questionnaires posted online using the Qualtrics Platform, and hard copies were available as well. The survey took approximately 30 minutes to complete. The data collection process rolled out between the month of October 2019 to February 2020.

III. RESULTS AND DISCUSSION

The purpose of this study is to examine the prevalence of online gaming addiction among Malaysian adolescents and to establish a better understanding of the profile of these young gamers.

3.1. Prevalence of online gaming addiction among study samples

This study has examined the prevalence of online gaming addiction among early Malaysian adolescents (between age 10 to 14 years old). This study found 1.9% (n=7) of the participating adolescents are addicted to online gaming, fulfilling all the seven criteria of addiction as stated by Lemmens et al. (2009) using the monothetic diagnostic criteria. Male gamers scored high in all the seven criteria than female gamers. This prevalence rate is very close to the median prevalence of 2.0% across ten countries

worldwide for IGD (Paulus, Ohmann, Gontard&Popow, 2018). However, compared to previous studies, the percentage in the present finding is much lower than other reported countries, for example, the prevalence of online gaming addiction in Austria is 2.7% a, 3.0% in Germany, and 1.6% in the Netherlands (Muller et al., 2015).

While the disparities of data could be attributed to socio-cultural difference and the criteria differences (for example, age, methods use), nonetheless the findings demonstrated that online gaming addiction is an ongoing occurring phenomenon among adolescents. To date, there is no local study found on the prevalence of online gaming addiction among adolescents. The most recent and close-related study of Malaysian adolescents (Meanage=13.89) found was a study by Hashim, Kaur and Ng (2016) who reported the prevalence of Internet Addiction (IA) 28.6%. As such, there is a strong need for researchers, mental health practitioners, educators, policymakers and parents to work together to prevent this issue from worsening.

3.2. Online Gaming Addiction and Gender difference

The findings from the study indicated that male gamers (Mean=2.66) are more susceptible to online gaming addiction than female gamers (Mean=1.69). The idea put forth to explain this finding is that female engage in gaming to pass the time and not to re-enact negative emotions, hence shorter duration on online gaming and screen time (Wei, Chen, Huang & Bai, 2012). Males are prone to pathological online gaming because their game choice is influenced by games that are closer to their behavioural and identity styles. For example, Griffiths, Davies and Chappell (2004) found that adolescents male tended to engage in games that are very masculine type characters. The high number of gamers (66%, n=247), showed that the two games responsible for the problematic use were Massively Multi-player Online Role-Playing (MMORPGs) game and first shooter games. Of these, 60% were boys. Simulation and MassivelyMultiplayer Online Role-Playing (MMORPG) games, such as 'ArcheAge', 'Lord of the Rings Online', and 'Star Wars: One explanation for this choice was that these vulnerable male adolescents may be insecure about their own identity in reality and may still be developing their own identity. Young (2009) stated that adolescents like role-playing to allow them to pretend living as 'someone' through a game character with extraordinary powers of a skilled warrior or be an artsy Machiavellian.

3.3. Online Gaming Addiction and Associated Growth-Stage Development

The participants (69.1%) in this study indicated that they play online games with their friends from schools, clubs, and social gathering. A likely explanation for this finding was the importance of social connection during adolescent development. Baumeister and Leary (1995) (cited by Allen, Ryan, Gray, McNerney, & Waters, 2014) describe that human need for a sense of belonging is as strong as a need for food, thus the pressure to seek and provide belongingness from and to others. Adolescents always seek to relate and need to be accepted by others. Playing a similar online game with a group of gamers with similar values, beliefs, and interests do facilitate the opportunities for the adolescent to interact and feel a part of one or more social groups.

On the other hand, Gapsiso and Wilson (2015) revealed that there is a positive relationship between people who spent a great deal of time online and increased feelings of loneliness and anxiousness. The term 'cyberostracism' was introduced to explain an exclusion from a group while playing games. The study compared the effects of cyberostracism across three age groups: 8- to 9-year-olds, 13- to 14-year olds, and adults found adolescents may be more strongly affected by cyberostracism. The effect ofcyberostracism disrupts the balance between social connectedness and self-identity that resulted in loneliness in oneself. Loneliness could have adverse effects on psychological wellbeing Gapsiso and Wilson (2015). Relying on digital media for social connectedness is most likely not recommended, especially in adolescents who are hyper-sensitive to rejection and exclusion in a group at their

development stage. The adverse effects may be more harmful to psychologically and destructive to adolescents who are still developing a sense of self.

3.4. Online Gaming Addiction and associated early gaming experiences

The third finding from this study is that a large percentage of the participants (n=377, 95.1%) reported to own electronic gadgets. 85.4% of the respondents reported owning mobile phones, laptops or computers (45.8%), tablets (33.4%), and game consoles (28.0%). In the recent SpeedTest survey, Malaysia ranked 3rd in the download Internet speed. With the infiltration of high-speed Internet and computer-powered smartphones, adolescents can easily access online games at any time and anywhere. Young children, when having easy access to Internet technologies and spend long hours on the Internet, are susceptible at-risk to internet addiction (Leung, 2004). Ling and Haddon (2008) shared that compulsive use of mobile phones for Internet gaming will subsequently result in addiction among adolescents. However, the finding from this study found no association between early-years gadget exposures to the level of online gaming addiction among the sample group. One possible explanation for this outcome would be parental attitudes towards the child, e.g. where parents demonstrate a high degree of care and are more involved in their supervision on their child's gadget use and content. Ko et al. (2014) shared that one of the key protective factors for IGD is parents who practice high psychological autonomy (e.g. respecting personal boundaries) at the same communicate clear gaming schedule rules. He emphasized that male adolescents, in particular, would benefit significantly from this.

Another interesting find from this study is that the age between 6 to 9 years old seems to be parent's preferred age to introduce their children to gadget activities, in terms of owning a gadget, played a game for the first time using a gadget, and playing an online game. One possible explanation for the scenario is that children at that age group were physically more active and need for attention. This finding can be viewed that Malaysian children have inactive lifestyles. This conclusion is congruent with Lee et al. (2015)'s study that Malaysian children have sedentary lifestyles, and spent their free time on screen-related activities, such as playing online games.

The study also suggested that a higher percentage of Malaysian children (68%) exceeds the recommended 2h/day screen time compared to children in the United States (44%) and Australia (59%). Griffiths (2010) observed that that young people were less involved in physical activities as parents are busy at work, the need to keep the child safe indoor, increasing urbanization, and traditional games are forgotten. Sedentary lifestyles may have adverse effects on physical health, such as obesity and malnutrition (Sherina& Ahmad, 2004). There is a need for policymakers and parent to consider promoting physical activities and healthy lifestyles to mitigate this issue.

3.5. Online Gaming Addiction association with Family Quality of Life

Fourth, this study revealed that an adolescent's level of satisfaction with the family quality of life significantly predicts their online gaming addiction. In this study, the researcher measured adolescent's satisfaction on his and her family quality of life, focusing mainly on the attainment of family support and family relationship. A healthy family quality generally attempts to develop and maintain the family relationship by building trust on each other, have a sense of belonging, and supporting each other at the time of trouble. Family members often engage in activities together as a family. Living in a family environment where family members are emotionally detached, disconnected, and self-serving can be depressing and lonely for an adolescent who seeks social connection. Lemmens, Valkenburg & Peter (2009) viewed that loneliness is strongly linked to game addiction.

Also, it is apparent that the less family support is, the more severe gaming addiction becomes As this study has indicated, adolescents who feel supported, loved, and cared about by the people around them

are generally satisfied with their family quality of life and is less likely to indulge in online gaming for social connection. Given that family is the central socialization unit for a child, it is evident that family connectedness and family support has a critical impact on the feeling of loneliness. Therefore, the finding of this study is in support of Woog (2016) 's suggestion that family support and guidance is vital for the process of recovering from game addiction.

3.6. Online Gaming Addiction association with Mother-Child Relationship

This study also revealed that there is a significant difference between female participants and male participants in terms of the mother-child relationship. Female gamers (Mean=72.39) reported a higher satisfaction relationship with their mother, just a small difference with male gamers (Mean=70.52). The finding suggests the possibility that the level of satisfaction in mother-child may predict the level of gaming addiction in online gamers, which is consistent with a study by Szwedo, Mikamii& Allan (2011) that found problematic mother-child relationship was predictive to adolescent internet use problem. Previous studies reported ‘low maternal care’ as a predictor factor to addiction in adolescents (Ko et al., 2014).

The explanation for this was adolescents reported poor mother-child relationship as they feel the mother was not supportive in their search for independence and autonomy. However, previous studies (Griffiths, Davies, & Chappell, 2004; Peng & Liu, 2010) state that negative parent-child relationship is the consequence of excessive video gaming, rather than a predictor of it. The finding from this study agrees with Choo et al. (2015); Kwon, Chung, and Lee (2011) and Walters (1999) view that male participants experienced a higher level of online gaming addiction and they reported lower satisfaction in the mother-child relationship. The possible explanation for lower satisfaction is that the mother and child may experience frustration and dispute in response to the mother trying to control the child's gaming time. In general, youth gamers have a better relationship with their mothers than fathers (Da Charlie, HyeKyung, & Khoo, 2011). It would seem the mother's role is significant counselling when doing intervention work with pathological youth gamers.

IV. CONCLUSION

In conclusion, the finding of this study indicates that the prevalence of online gaming addiction among Malaysian adolescents is at 1.9%. Male gamers (Mean=2.66) are reported to be more susceptible to online gaming addiction than female gamers (Mean=1.69). Choice of the game genre is also a predicting factor to online gaming addiction, as revealed in this study. Multi-player Online RolePlaying Games (MMORPGs) recorded highest in games choice (n=247, 66%), of which 60% were boys. Many literature studies concede that MMORPGs is the most addictive online game to date. This study is also congruent with other study findings that family quality of life and parent-child relationship, especially mother-child relationship, have a positive role in managing the level of online gaming addiction among adolescents.

The possible explanation could be because the family is the central unit socialization for many adolescents. The mother role seems to have a significant influence on the adolescent's level of online gaming. The study on family and especially the role of mother in child's online gaming activities could perhaps help researchers, policymakers, mental health practitioners and medical experts develop programs and counselling treatment approaches that would help prevent and mitigate the level of online gaming addiction in adolescents.

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HEALTH LITERACY INNOVATION: A SURVEY TO UNDERSTAND THE PATIENT'S NEED. THE TIME IS COMING TO ADAPT THE PACKAGE INSERT USING DIGITAL

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ABSTRACT

This study was carried out in collaboration with a patient association, “Patient Focused Medicines Development” (PFMD), that has developed a survey of 18 questions to understand patient perspectives and expectations regarding the drug package insert. It was shared with a large group of responders (1029) from different countries (71% Northern America; 25% Europe; 4% others), different age groups and pathologies (chronic / non-chronic). The most represented age group is 60 to 69 years old (26.7%) then 50 to 59 years old (19.2%) and those over 70 years old (18.6%). Of the respondents, 81.9% had a chronic illness. The patient insert is the main and only required documentation for communicating information about the drug use to the patient. The literature mentions the importance of the information provided to the patient to stick to their treatment but also underlined the limitation of this source of information. The result of this study showed among the responders, only 24% of our subjects read the paper version of the package insert exclusively. The objective of this paper is to understand why drug insert paper support is not sufficient to address patient needs, 76% responders read the package leaflet or information available for the medication provided by the company, through websites or other sources (North America 73.1%, Europe 82.1%). In addition, almost half of the subjects do not keep the package insert for future reference or verification because they have access to the information on the internet. Throughout our study, we also highlighted the difficulties that our subjects faced, such as the lack of lay language, the size of the font, the layout and the amount of information. Some individuals find themselves drowning in information written in medical jargon that they do not always understand. The challenge today lies in designing a leaflet that is adaptable to all and that responds to patients' complaints and needs. In the future, the patient insert will be interactive and digitalized.

Keywords - Digital Labeling, Perception Public, Medicine Information, Medicine Labeling, Health Literacy.

I. INTRODUCTION

Now more than ever, patients are looking for transparent health information, especially about their drug treatments. Several studies have shown that understanding the package leaflet of the drug improves treatment adherence and patient satisfaction [1]. Furthermore, many patients demonstrate sub-optimal management of their condition, often because they do not have all the necessary information [2]. To ensure an effective and safe treatment, the patient's knowledge of their drugs is paramount [3]. This knowledge should focus not only on the reason for the choice of drug, but also on how the drug is taken, as well as the expected benefits of the treatment and the potential adverse effects. A good understanding of their drug treatment would allow the patient to make better use of the drug and have better adherence

to the treatment[4].The result is increased therapeutic efficacy and therefore greater patient safety. However, patients generally do not have adequate knowledge [5]. Thus, patient adherence is crucial to achieving the therapeutic goal. However, it does not apply to the entire population, for various reasons, including the onset of adverse effects, lack of motivation or information [6]. The patient often misunderstands or forgets much of the information they receive from the healthcare professionals (HCP) they meet. The pharmacist therefore has a strategic place in the patient care process. The pharmaceutical care provided, encompassing dispensing drugs, providing information and advice to the patient as well as follow-up, is the “last defense” between the doctor’s instructions and when the patient finds themselves face-to-face with their drug and the accompanying leaflet [7]. In addition to oral information, written information is critical to increase the amount of information that the patient retains and puts into practice. It will remain available for future reference, not only for the patient, but also for their relatives and for caregivers [8]. Each registered drug has a package leaflet inside its packaging. This package leaflet provides product information, including but not limited to clinical pharmacology, recommended dose, method of administration, warnings and contraindications, adverse effects and precautions to avoid or minimize risks[9]. The World Health Organization (WHO) estimates that more than 70% of patients receiving medications do not read the package leaflet (particularly in developing countries) (World Health Organization 2002). This study should help to define a new concept for the patient leaflet to better address the patient’s need.

Main points will be studied in this paper.

II. MATERIALS AND METHODS

The patient association, Patient focused Medicines Development (PFMD) is an independent, non-profit association. This association brings together many stakeholders and actors in the health system, whether they are patients or they act within the pharmaceutical industry, academic or regulatory system. They work together on different projects to improve patient engagement and inclusion in the development of drugs and health products. The association developed the questionnaire (Table 1) which we have analyzed. In this article we will have an overall analysis of the answers to the questions.

A. Patient questionnaire (Table 1)

The questionnaire consists of eighteen questions, including open-ended questions and multiple-choice questions. For six of the eighteen questions, the respondent had the option to write their answer in their own words. There are two scenarios, depending on whether or not, there is a chronic disease and whether long-term medications are taken.

Table 1 - List of survey questions.

Q1: Who are you?

Q2: Choose your gender

Q3: Choose your age group

Q4: Choose your location

Q5: Do you or the person you care for have a chronic condition (i.e. a condition that lasts for a long time such as diabetes, cancer, asthma, etc)?

Q6: What is your current condition?

Q7: Did you / Do you read the package leaflet or information available for the medication provided by the company, through websites or other sources?

Q8: Did you find the provided information (within the package leaflet for the medication) easy to understand?

- Q9: What would you like to know before taking the medicine?
- Q10: Is there any other information you would like to see on an information leaflet (e.g. signposting to other resources)?
- Q11: When would you want to see this type of information?
- Q12: How would you like to receive this information?
- Q13: When would you like to receive this type of information?
- Q14: What would be your preferred format for this information?
- Q15: Please tell us how you normally take the prescribed treatment /medication by choosing the most relevant statement.
- Q16: Do you find the current language used in patient information leaflet understandable?
- Q17: Would receiving an additional information leaflet with the necessary information in understandable language support you in taking medication as prescribed?
- Q18: Would you like to tell anything else related to this topic that we didn't ask you about?

B. Questionnaire design methodology

A literature review was conducted by PFMD Working Group 4. For the design of these questionnaires, it was important to first determine the different aspects of the development of package leaflets including patients and to understand the relationship between the package leaflet and treatment adherence. The literature review on this topic enabled an objective analysis to be conducted of the current knowledge of package leaflets for patients.

C. Database

The database primarily used is PubMed. Other databases have been consulted, including MEDLINE, Embase, CINHALL, PsychINFO and DARE. The list of references of each article resulting from the research were also examined to identify other articles relevant to our topic. The websites of the Food and Drug Administration (FDA), European Medicines Agency (EMA) and other regulatory agencies have also been consulted.

III. RESULTS AND DISCUSSION

D. Respondent profile.

87.9% of respondents were patients, 7.6% were parents and 4.6% were others, i.e. healthcare professionals, former patients (Figure 1).

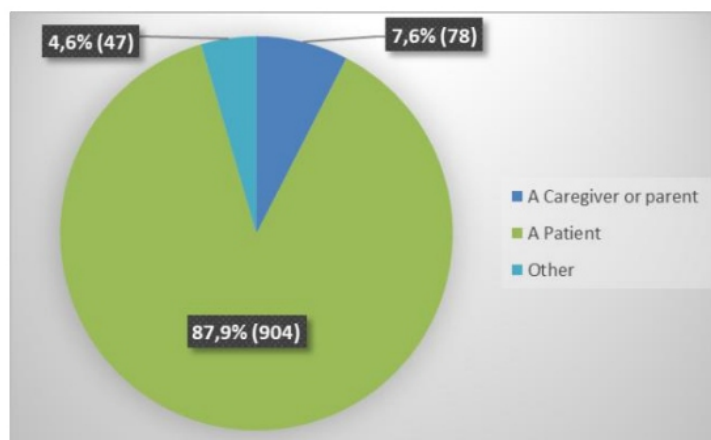
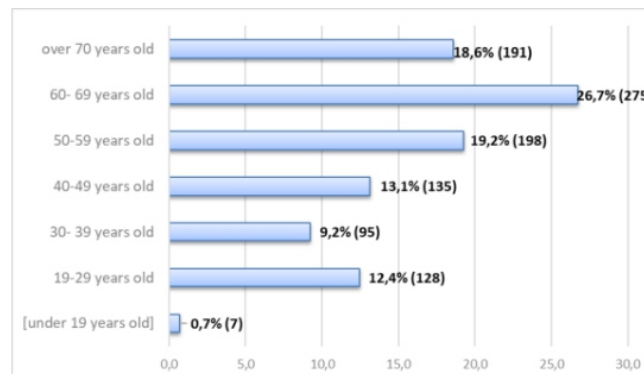


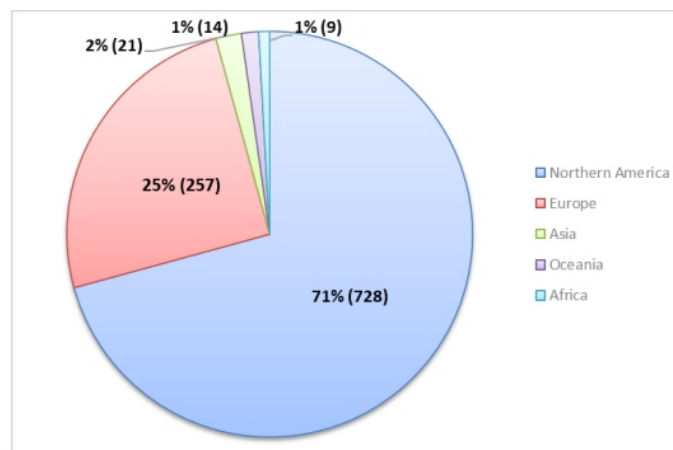
Fig.1. The different types of individuals who completed the questionnaire.

Of these, 63.7% were female (655), 36.2% were male (372) and 0.2% were other (2).

Distribution of age (Fig.2a)



Distribution of geographic location (Fig.2b)



The most represented age group is 60 to 69 years old (26.7%) then 50 to 59 years old and those over 70 years old. Of the respondents, 81.9% had a chronic illness. Of the respondents, 93.7% were on drug treatment; the responders (1029) are established in different countries (71% Northern America; 25% Europe; 4% others).

E. Patient labeling, use and understanding

In question Q7: Did you / Do you read the package leaflet or information available for the medication provided by the company, through websites or other sources?

Of the 1029 respondents, 76% of patients answered yes to this question and read the package leaflet or information available for the medication provided by the company, through websites or other sources.

In the group of respondents who do not read the package leaflet, or the drug information provided by the manufacturer, the majority explain that this because they have already received the information from a HCP. Some mention other reasons: the leaflet contains too much information, I read the leaflet for the first use, the content is too technical, the text is too small, I am familiar with my drug, I read other sources, I only read the side effects, I have medical training, I don't want to know.

F. Patient information support and format

Question 12: How would you like to receive the information?.

The majority of patients choose via HCP then via the internet, and a few via patient organizations. (Fig.3.)

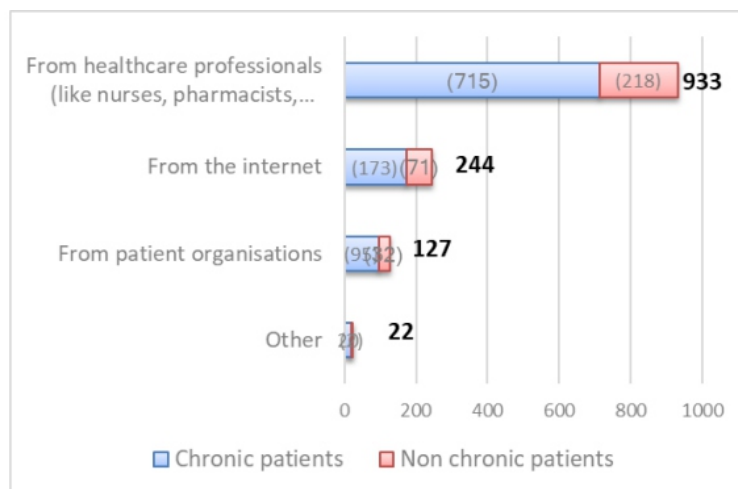


Fig.3. Preferred sources of information on the drug

Question13: *When would you like to receive this type of information?*

It appears from our survey that the majority of subjects wish to receive information about their treatment when they discuss the different treatment options with healthcare professionals (57% or 579 subjects); 36% (376 subjects) wish to receive information before taking the drug, 7% (74 subjects) wish to receive information after taking the drug. Our results shows that the majority of subjects would like to receive additional information from HCPs

Question14: *What would be your preferred format for this additional information?*

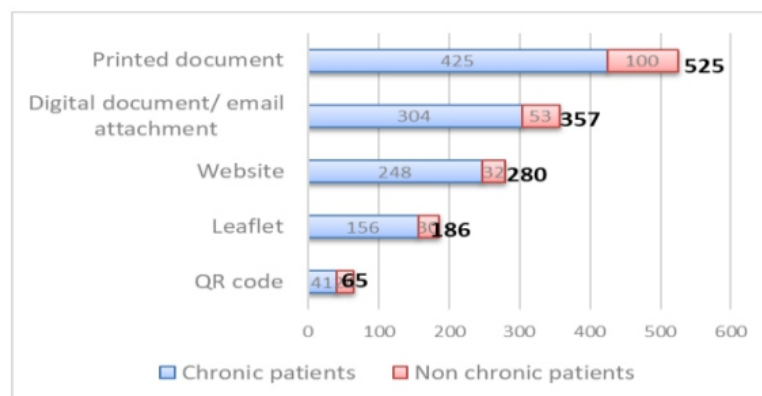


Fig.4. Subjects' preferred format

Approximately 50% of subjects would choose a paper format (525+186) and 50% a digital format (357+280+65) to receive additional information. Question 17: *Would an additional package leaflet with information written in clear, understandable language help you take your treatment as prescribed?* 63.1% yes, 30.4% no, the majority of respondents want additional explanations to better understand their leaflet.

G. Variables studied

As this is a global survey, it is important to understand the key parameters that could influence the choices of survey respondents. Therefore, we will review the answers of the questions 7,8,9 of the survey (table 1).

This is a descriptive statistical study intended to identify trends among respondents of varying geographical origin (#1) (Fig.2.) of different ages (#2) (Fig.2.), with or without a chronic disease (#3).#1 The influence of geographical location: 70% of respondents are based in the USA and 25% in Europe.
#2 The influence of age: The age range most represented in this study (~2/3) is 60 to 69 years old (26.7%), followed by 50 to 59 years old (19.2%) and over 70 years old (18.6%).#3 The influence of chronic or non-chronic condition. The majority of respondents (80%) suffer from a chronic illness, primarily renal failure. What is the influence of the answers according to these 3 variables on the 3 questions (No. 7; No. 8; No. 9)?Main results will be discussed.

Question 7: *Do you read the package leaflet or information available for the medication provided by the manufacturer through websites or other sources?*#1 North America yes 73.1%, Europe 82.1%. The geographic parameter does not have a significant influence for respondents in the majority group in this question. #2 Is age an influencing factor?

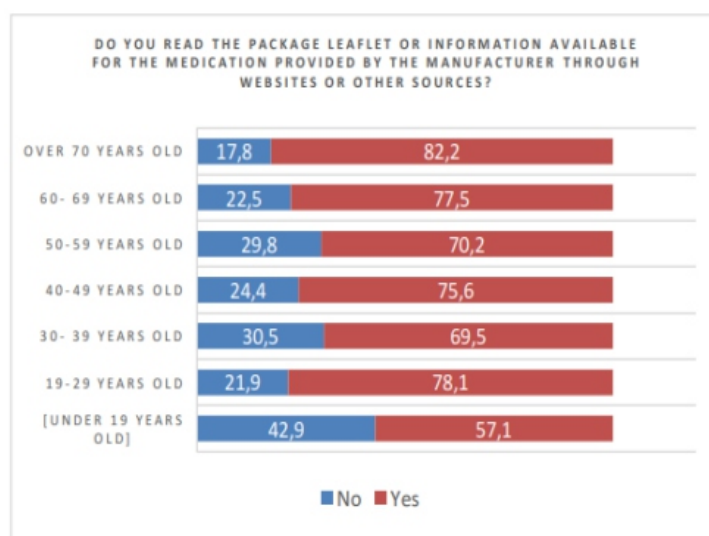


Fig.5.The proportion of individuals reading the package leaflet according to age.

We observe little disparity between the different age groups of respondents when it comes to the question regarding reading the package leaflet or searching for other sources of information on the drug; except in the group under 19 years old, who are the patients of the future and who must be taken into consideration to develop the future package leaflet. #3 The majority of responders (76%) read the package leaflet or information available for the medication provided by the company, through websites or other sources. In this group the majority (59.4%) are chronic patients.

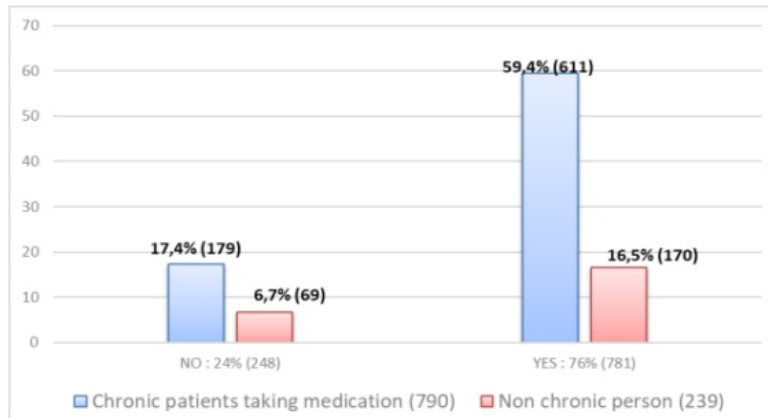


Fig.6. The proportion of responders (1029) reading (76%) or not reading medication (24%) provided by the manufacturer through website of other sources, with a chronic or non chronic treatment.

Question 8. *Did you find the provided information (within the package leaflet for the medication) easy to understand?*

#3- A large majority of respondents (753 individuals, 96.4%) who read the package leaflet say that they understand the information it contains (Fig.7.). 75,7% in this group of responders are chronic patient. Question 9: What would you like to know before taking the medicine? (1029 responders)?

#3- In the 2 groups of responders (Chronic / Non Chronic-No medication) group, the most important information is the list of side effects. The section „how to use the drug“ is listed as important (2nd ranking for Chronic patients and 3rd ranking for non chronic patients). Description of the medicines is ranked 3rd (ranked 5th non-chronic) for Chronic patients and how long to take the medicine is ranked 5th (ranked 3 non-chronic).

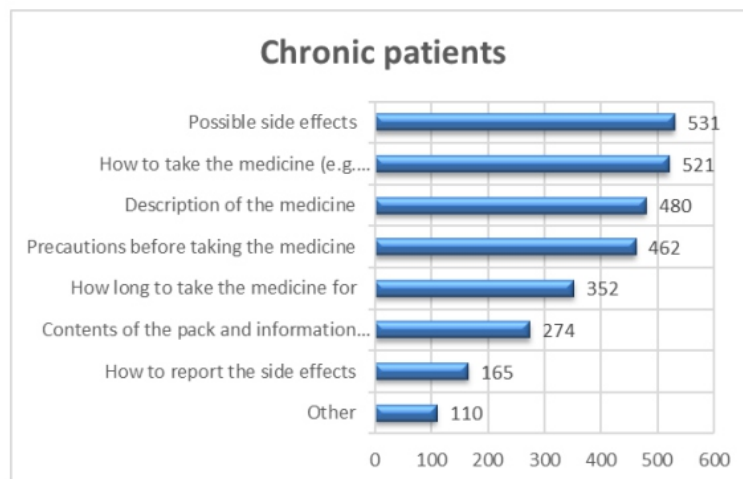


Fig.7a

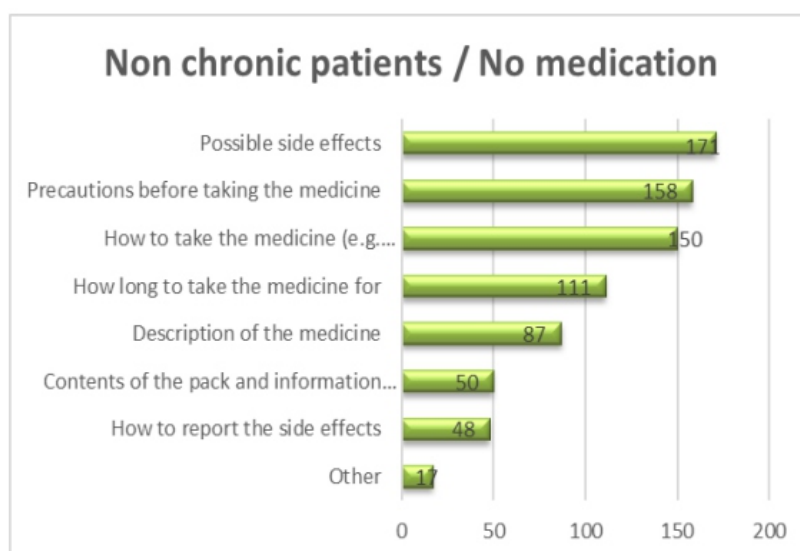


Fig.7b

What respondents would like to know before taking the medication? This means that the 5 important chapters of the patient labeling is common in the 2 groups of patients. Side effects are the most important information, while the way to report side effects listed as less important. This highlights the need for the Health Authorities to clearly communicate to the customers (patient), the importance to report side effects.

Question 15 *Please tell us how you normally take the prescribed treatment /medication by choosing the most relevant statement?*

We observe that 41.4% of respondents reported stopping the drug after reading the warnings and precautions mentioned in the leaflet. The information in the section “warnings and precautions” have the role of alerting and protecting the patient in the event that they have a medical condition, lifestyle or if they are already on a drug treatment incompatible with the drug in question. This observation leads us to question the impact that these warnings have on the proper use of drugs by patients: did the responders (58,6%) who reported continuing the drug after reading the warnings and precautions consciously ignore them despite being concerned, or were they simply never concerned by them? A digitalized, up to date patient leaflet with interactive links could help the patient to take the best decision for his treatment.

IV. CONCLUSION

Our study is based on a survey of 1029 patients globally, reflecting their critical opinion on the information they currently have about their medication and what they expect.

According to the results of the study, patients are now looking for information outside of the paper format of the package leaflet provided by the manufacturer, regardless of the age or geographic origin of the 1,029 respondents (20–30%). However, in the group of young respondents (under the age of 19, who are the reflection of future patients), 50% report reading information about their drugs from digital sources. In addition to educating and training healthcare professionals, who remain the main point of contact for patients regarding their health, we hypothesize that access to digital sources controlled by the Health Authorities (EMA, FDA, National Health Agencies), via an electronic patient leaflet, will help solve the problems revealed in our study.

Today, some Health Authorities around the world are actively working on developing guidance to provide the patient with a reliable and accessible digital source of information on the package leaflet [10]. Creating an online version of the drug package leaflet would make it possible to optimize its use by the patient and thus improve the proper use of the drugs. The digital package leaflet will enable interactive consultation.

The patient will be able to access the information concerning them in a readable and easily accessible format, enabling them to consult it multiple times and allowing updates, especially regarding side effects. According to our study, this is the section most often consulted when searching for information. Our study demonstrated that the package leaflet in its current format does not fully meet the patient's need.

The structure of the questionnaire developed by the patient association demonstrates the key role it can play in helping the regulator to develop a package leaflet that addresses patients' real needs. The patients of the future will no longer read the leaflet in its current format but on a digital medium addressing their specific needs.

ACKNOWLEDGEMENT

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CONFLICTS OF INTEREST

All authors declare that they have no conflicts of interest.

(1)

"The opinions and viewpoints expressed by Isabelle Rooseleer are her own and do not necessarily reflect the opinions and viewpoints of her current employer, Organon Belgium BV."

(2)

"The opinions and viewpoints expressed by Michèle Noumbissie are her own and do not necessarily reflect the opinions and viewpoints of her current employer, AIXIAL Belgium".

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ASSESSMENT OF THE EFFICACY OF LEAVE EXTRACTS OF SOME BOTANICALS AGAINST BLACK POD DISEASE OF COCOA (THEOBROMA CACAO. L)

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ABSTRACT

This study assessed the efficacy of Chromolaenaodorata, Acalyphawilkesiana, Tithoniadiversifolia, and Vernoniaamygdalinacrude leaves extracts for black pod disease of cocoa (Theobroma cacao L.) control. Phytophthoramegakarya was isolated from cocoa pods with symptoms of black pod disease, identified and the pathogenicity of the disease was established. Aqueous and N-hexane extracts of Chromolaenaodorata, Acalyphawilkesiana, Tithoniadiversifolia, and Vernoniaamygdalina, and Ultimax fungicide (used as the standard for comparison) were prepared and tested against the fungal pathogen at 30, 50, 70, and 100% concentration respectively, poison food technique. Agar plates without extract/fungicide served as the control. Aqueous N-Hexane extracts of the medicinal plants, exhibited significant inhibitory effects on the radial mycelial growth of the fungal pathogen at the tested concentrations, and Vernoniaamygdalina extracts were most effective against the fungal pathogen at 30% N-Hexane extract, 80.78% inhibition and 100% aqueous 71.06%. Vernoniaamygdalina extract competed favourably with the standard (Ultimax fungicide) in the mycelial inhibition of P.megakarya. Vernoniaamygdalina was most effective against for cocoblack pod disease and can substitute harmful synthetic agrochemicals.

Keywords- *P. megakarya, Cocoa, Botanical extracts, Fungicides, Black pod disease*

I. INTRODUCTION

Cocoa (Theobroma cacao) is cultivated worldwide in countries like Nigeria, Ghana, Indonesia, Ivory Coast, Cameroon and Brazil on land mass of over 700,000 km². It's a major cash crop in the tropics and the source of chocolate, one of the world's most popular foods. In addition, cocoa-based agroforestry systems provide a promising means to address the challenges of deforestation and create a habitat for biodiversity, while simultaneously providing a profitable crop for agricultural communities (1). Nigeria cocoa economy has a rich history; the contributions of cocoa to the nation's economic development are vast and have been reported by many authors (2). It has remained a valuable crop and major foreign exchange earner among other agricultural commodity exported by Nigeria (3, 4).

Cocoa productivity is affected by some environmental factors however; pests and diseases are the most serious constraints. Hence, cocoa is currently under serious threat due to these diseases (5), of which cocoa pod rot, commonly called „black pod disease“, is the most economically important as the major constraint to the cocoa production in West Africa (6). Phytophthoramegakarya are majorly responsible for black pod rot of cocoa in Nigeria, it was first identified in Nigeria in 1979 and became predominant in

disease can cause 30–90% annual crop loss for farmers and, thus, it poses a severe threat to the cacao industry and to producers (5).

In a bid to correct the undesirable yield and productivity reductions caused by *Phytophthora megalakarya*, several methods have been used which includes the use of synthetic fungicides and planting resistant trees but none of them have adequately controlled the disease (7). The synthetic fungicides are highly toxic, persistent and broad spectrum compounds and can contaminate ground water, thus posing danger to non-target organisms and the environment (8). The use of Crude extracts from plants materials have been found to synthetically inhibit mycelial growth of many pathogenic fungi in the laboratory and found to be highly effective on the field (9, 10). Hence, this study aims to assess the efficacies of crude extracts from the leaves of some botanicals; *Tithonia diversifolia*, *Chromolaena odorata*, *Vernonia amygdalina* and *Acalypha wikesiana* in the control of black pod disease of cocoa caused by *Phytophthora megalakarya*.

II. MATERIALS AND METHOD

Collection of Materials

Phytophthora species was isolated from a naturally infected cocoa pod fruits showing a typical symptoms of black pod disease (characteristic sea weed odour) from plot of Cocoa Research Institute of Nigeria, Ibadan. Fresh leaves of *Acalypha wikesiana*, *Chromolaena odorata*, *Vernonia amygdalina* and *Tithonia diversifolia* were obtained from the Polytechnic Ibadan, the North Campus. The plants were brought to the laboratory in a sterile sampling bags, well labeled for identification and further analysis. After identification, the leaves were surface sterilized with 2% sodium hypochlorite (NaOCl) solution for 2 minutes to remove contaminants and rinse thrice in sterile distilled water. It was then air dried at room temperature for several days before bioassay studies. Unpeeled fresh carrots (*Daucus carota*) were purchased locally from open retail market at Sango, Ibadan. The samples were conveyed to the laboratory aseptically in a clean Ziploc bag. Samples were labeled for further analysis.

Preparation of Culture Medium

The carrot medium was prepared and adjusted to pH 5.6 ± 0.2 at 25°C by addition of 1.3ml of sterile 10% lactic acid to every 100ml of sterile cooled carrot medium (11)

Isolation and Identification of *P. megalakarya*

The determination and identification of *Phytophthora* species was done as described by following the pattern of growth in culture (colonial characters) and morphological characters (Sporangial shape, size and pedicel length) (12,13). Isolation of *P. megalakarya* from a naturally infected cocoa pod fruits showing a typically sea weed odour were made by cutting a piece of infected pod tissue using sterilized scalpels. It was surface sterilized in 10% sodium hypochlorite solution and rinsed in 3 stages of sterile distilled water, blot dried in Whatman filter and culture on amended carrot agar medium. The culture plates were incubated at 22 ± 20°C for 5 – 7 days in the dark. Subsequent sub culturing were maintained on carrot agar and V8 Juice agar slant as stock at 22 ± 20°C for periodic use in the mycobank.

Preparation of Crude Extract of the Leaves

Four different concentrations of aqueous extracts and N-Hexane were prepared and the crude extracts of the leaves were prepared using the amended method (14)

Preparation of fungicide (Ultimax Fungicide)

The approved fungicide by Cocoa Research Institute of Nigeria for treatment of cocoa black pod disease, Ultimax fungicide (0.3g and 0.4 g), was weighed and dissolved in sterile distilled water (SDW) in a 100ml capacity volumetric flask and it was used as standard for comparison.

Experimental Procedure

The effect of plant extract on the fungal growth was determined using food poisoning techniques. One (1ml) from different concentrations of extract; 30, 50, 70 and 100% were respectively dispensed into 9 ml of molten carrot agar to obtain an agar-extract mixture in Petri dish. The plates were gently rotated to ensure even dispersion of the extracts. The fungicide (Ultimax Fungicide) concentrations of 0.3g/50ml and 0.4g/50ml was also mixed with carrot agar and an agar plate containing no extract/fungicide served as the control.

The agar extract mixture was allowed to solidify and 7mm diameter cork borer 3 mycelia disc obtained from the colony edge of 10-14 days old culture of the *Phytophthoramegakarya* isolate was inoculated into the centre of each Petri dishes. Incubation was done at 22 + 20C and radial growth was measured 3, 5 and 7 days. Colony diameter dimension was taken.

There were 3 replicated plate of extract agar per isolate and concentration, also, for fungicides (Ultimax Fungicide) and control plates respectively.

Percentage inhibition was calculated according to the method described by (15).

$$\% = \frac{R1 - R2}{R1} \times 100$$

Where R1 = Furthest radial distance of the pathogen in control plates

R2 = Furthest radial distance of the pathogen in extract incorporated plates (treatment)

Inhibition percentage was determined as a guide in selecting the minimum inhibitory concentration that will be effective in controlling black pod diseases of cocoa.

Extract were rated for their inhibitory effect using the scale described by (16)

≤	%	Inhibition (Not Effective)
>	0 – 20%	Inhibition (Slightly Effective)
<	20 – 50%	Inhibition (Moderately Effective)
>	50 - < 100%	Inhibition (Effective)
	100%	Inhibition (Highly Effective)

Statistical Analysis

Results obtained were statistically analyzed with the aid of SAS 9.1 software package and the mean were separated using Duncan's Multiple Range Test (DMRT). The results showed that not all the tested concentrations (30, 50, 70 and 100g/100ml), significantly ($p < 0.05$) reduced the mycelia growth of the fungi in vitro.

III. RESULTS

Antifungi effects of *Acalyphawikesiana* on *Phytophthoramegakayar*

The antifungal effect of *A. wilkesiana* extract on the mycelial growth of *Phytophthoramegakarya* presented in Table 1 showed that the percentage inhibition exhibited at 30% concentration ranged between 20.44 and 74.70% at 50, 70 and 100% concentrations, inhibition ranges are 14.86 – 76.85%, 13.28 – 78.15% and 13.7 – 78.15% respectively, while the standard (ULT/Ultimax Fungicide) exhibited mycelia inhibitions of between 37.02 – 84.69% against the pathogen.

A.wilkesianaexhibited 74.7% at 30% concentration of aqueous extract after 7 days, 76.85% at 50% concentration of N-Hexane extract after 7 days, 78.15% at 70% concentration of N-Hexane extract after 7 days and 78.15% at 100% concentration N Hexane extract, after 7 days respectively against the pathogen. 30 and 100% also 50 and 100% concentrations of the aqueous extract, exhibited the lowest inhibitions at 3 days of incubation.

Antifungal effects of Vernoniaamygdalina on Phytophthoramegakayar

The antifungal effect of V. amygdalinaextract on the mycelial growth of Phytophthoramegakarya presented in Table 2 showed that At 72 hours of incubation, concentrations 30 and 50% of the Nhexane extract gave the highest inhibitions (80.78 and 80.44% respectively), while 100% aqueous extract concentration exhibited the significantly lowest mycelial inhibition (18.75%) of the pathogen when compared with others after 7 days.

	Percentage Inhibition					
	Aqueous Extract			N-Hexane Extract		
	Day 3	Day5	Day 7	Day 3	Day 5	Day 7
30	22.44	20.49	74.7	69.38	62.71	68.83
50	14.86	15.54	72	70.06	51.52	76.85
70	28.86	13.28	73.8	72.79	53.38	78.15
100	13.7	27.15	69.8	72.79	53.38	78.15
Control	0	0	0	0	0	0
Ult	37.02	45.94	84.15	84.69	84.23	40.22
P – Value	0.0142*	0.0229*	0.0043*	0.0044*	0.0066	0.0068*

Table 1: Percentage Inhibition of Extracts of Acalyphawilkesiana on P. megakarya ULT: Ultimax Fungicide *p<0.05 statically significant **p<0.01 statistically significant *p<0.001 statistically significant**

	Percentage Inhibition					
	Aqueous Extract			N-Hexane Extract		
	Day 3	Day 5	Day 7	Day 3	Day 5	Day 7
30	61.4	54.9	24.6	80.78	76.7	74.7
50	69.29	65.49	31.64	80.44	77.38	72
70	70.17	66.27	21.48	76.53	64.63	73.86
100	71.06	67.45	18.75	74.14	67.34	69.8
Control	0	0	0	0	0	0
Ult	52.63	58.82	15.63	84.69	84.69	84.15
P – Value	0.0115*	0.0067**	<0.0001***	0.0559	0.0300*	0.0312

Table 2: Percentage Inhibition of Extracts of Vernoniaamygdalina on P. megakarya ULT: Ultimax Fungicide *p<0.05 statically significant **p<0.01 statistically significant *p<0.001 statistically significant**

Antifungal effects of Tithoniadiversifoliaon Phytophthoramegakayar

Table 3 shows that the percentage inhibitions exhibited by 30% concentration of Tithoniadiversifoliaextract on the mycelial growth of the test pathogen ranged between 24.12 and 73.86%, while those of 50, 70 and 100% extract concentrations ranged between 24.56 – 75.04, 17.5 – 72.95 and 16.32 – 72.78% respectively.

The inhibition exhibited against the test pathogen by the standard was significantly higher than those of the extract concentrations except at 30 and 70% aqueous extract after 5 days, 27.34 and 25.3% respectively. 100% aqueous extract concentration had the significantly lowest inhibitions after 5 days of

incubation.

Antifungal effects of Chromolaenaodorata on Phytophthoramegakayar

The inhibitory effects of Chromolaenaodorata on mycelial growth of P. megakarya are as shown in Table 4. The percentage inhibitions exhibited by 30, 50, 70 and 100% concentrations of the extract ranged between 43.05 – 78.23%, 24.53 – 75.34%, 27.77 – 75.52% and 44.44 – 71.6% respectively. One hundred (100%) aqueous extract concentration gave higher mycelial inhibitions after 3, 5 and 7 days (44.44, 60.06 and 60.53% respectively) than other aqueous extract concentrations of the botanical. But, in N-Hexane extract concentrations within the same incubation period, 30% and 50% and 70% exhibited the higher mycelial inhibitions of 78.23%, 75.52% and 75.04% respectively. N-Hexane extract inhibitions after day 3 and 5 were not significantly different.

	Percentage inhibition					
	Aqueous Extract			N-Hexane Extract		
	Day 3	Day 5	Day 7	Day 3	Day 5	Day 7
30	24.12	27.34	54.8	69.38	62.71	73.86
50	24.56	25.3	50.25	70.23	69.83	75.04
70	17.5	20.4	52.61	72.95	70	64.25
100	17.55	16.32	50.08	72.78	64.49	65.94
Control	0	0	0	0	0	0
Ult	52.63	20.4	84.14	84.69	84.69	84.15
P – Value	<0.0001***	<0.0001***	0.0056**	0.0283*	0.0213*	0.0248

Table 3: Percentage Inhibition of Extracts of Tithonia diversifolia on P. megakarya ULT: Ultimax Fungicide *p<0.05 statically significant **p<0.01 statistically significant *p<0.001 statistically significant**

	Percentage Inhibition					
	Aqueous Extract			N-Hexane Extract		
	Day 3	Day 5	Day 7	Day 3	Day 5	Day 7
30	43.05	49.86	50.53	78.23	74.83	73.86
50	24.53	49.59	51.05	75.34	72.45	75.04
70	27.77	51.23	52.11	73.98	75.52	56.25
100	44.44	60.06	60.53	71.6	70.07	65.94
Control	0	0	0	0	0	0
Ult	0	40.49	40.52	84.69	84.69	84.15
P – Value	<0.0003**	<0.0010**	0.0013**	0.0389*	0.0341*	0.0248*

Table 4: Percentage Inhibition of Extracts of Chromolaenaodorata on P. megakarya ULT: Ultimax Fungicide *p<0.05 statically significant **p<0.01 statistically significant *p<0.001 statistically significant**

IV. DISCUSSION

The medicinal value of plants lies in some chemical substances that have a definite physiological action (17). Hence, the present study was carried out on crude botanicals used in the control of P. megakarya. It is expedient from the current study that; leaf of plant species were used. According to (18), most of the plant parts used in different preparation for remedy were leaves. The beneficial medicinal effects of plant materials result from the combination of the varieties of the metabolites present in the botanical species used in the current study and it was responsible for their effectiveness against P. megakarya. It has been widely reported that the activities of secondary metabolites like alkaloids, saponins, tannins and cardiac glycosides might be responsible for the treatment of diseases (19).

Among all botanicals extracts evaluated for efficacy against black pod disease pathogen,

Vernoniaamygdalina was the most effective (80.78% inhibition) followed by Acalyphawikesiana (13.7% inhibition). Antifungal activities were observed in all the crude aqueous extracts with stimulatory effect on the growth of *P. megakarya*. The antifungal activity of the botanicals against *P. megakarya* was suspected due to the presence of few secondary metabolites such as alkaloids, flavonoids, glycosides, phenols, saponins and steroids (17).

All the tested concentrations of Vernoniaamygdalina competed favourably with the standard (Ultimax Fungicide) in the mycelial inhibition of the test pathogen. This may be as a result of the diverse antifungal components such as phenol, lignin, terpene and the flavonoids it possesses (19).

V. CONCLUSION

The results of this study showed that N-Hexane extract was a better solvent compared with aqueous extract for botanical crude extraction. Crude NHexane botanical extract of *V. amygdalina* leaves had the highest or the most effective antifungal activity against the test fungus as shown 80.78% inhibition in mycelial growth inhibitory assay by poisoned food technique.

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LIFE CYCLE ASSESSMENT OF CANNED FISH PRODUCTION IN THAILAND

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ABSTRACT

The purpose of this study is to assess environmental performance of canned fish production of a factory in Samut Sakhon, Thailand, based on Life Cycle Assessment (LCA). An LCA application, SimaPro, was used for the study with CML 2 baseline 2000 method, which covers ten impact categories, including acidification potential (AP), ozone layer depletion potential (ODP), abiotic depletion potential (ADP), global warming potential (GWP), eutrophication potential (EP), photo-chemical oxidant formation potential (POFP), freshwater aquatic ecosystem potential (HTP). Results showed that human toxicity, marine aquatic ecotoxicity, global warming, freshwater aquatic ecotoxicity, and terrestrial ecotoxicity were found to have the greatest environmental impacts when compared with all other categories. Steam and tinplate consumption have the highest overall impact percentages of 55% and 43%, respectively.

Keywords - Life cycle assessment (LCA), Environmental impacts, canned fish production

I. INTRODUCTION

In 2018, food industry is a controlled industry that consumes the second-highest amount of energy in production after power plants, and canned seafood industry ranks fourth in terms of energy consumption in the food industry group (Wiriyaangkul, 2021).

Material preparation is one of the most important stages in the production of solid waste, with fish residue weighing up to 250-300 kg/ton frozen fish. In the sterilization step, the proportion of steam consumed can reach 290 kg/ton of frozen fish.

(UNEP, 2000). Furthermore, the stages of washing raw materials and cleaning packaging produce the most wastewater (Pollution Control Department, 2005). The canned fish industry is very important to the Thai economy because of its high quality, ASEAN's best safety standards, and global recognition.

In addition, Thai canned food products are one of the world's most popular exports because of consumer trust, and the location is ideal for the seafood industry (Nguangphan, 2022). Commercial competitiveness, on the other hand, must be improved because of the competitive conditions in the global market. Thailand has 105 canned fish factories. (Food Intelligence Center, 2020). The study was conducted by collecting data from a company in Samut Sakhon province because it is a professional producer of frozen surimi and canned fish for both export and domestic sales. The most popular products are Sardine and Mackerel in tomato sauce with a total productivity volume of up to 37,889,422 cans/year. However, due to high productivity, the company consumes many resources entering the process and generates a large amount of wastewater and solid waste. This study begins with a review of processes.

The company has four main processes, which are as follows

-
-
1. Raw material preparation
 2. Packaging in container
 3. Sterilization
 4. Labelling

This study assesses the environmental impacts of canned fish production by first defining the goal and scope, and then conducting an inventory analysis using SimaPro version 9.0.0.35 and the CML 2 baseline 2000 method, which covers ten impact categories, including acidification potential (AP), ozone layer depletion potential (ODP), abiotic depletion potential (ADP), global warming potential (GWP), eutrophication potential (EP), photochemical oxidant formation potential (POFP), freshwater aquatic ecotoxicity potential (FETP), marine aquatic ecotoxicity potential (METP), terrestrial ecotoxicity potential (TETP), and human toxicity potential (HTP). Furthermore, options based on Clean Technology are being proposed to reduce resource consumption. Thus, The Life Cycle Assessment (LCA) and Clean Technology (CT) are comprehensive ways to cover and improve all impacts, which lead to pollution control from the production, as well as the quality of life of people in the workplace and surrounding communities, creating economic, social, and environmental business operations, also known as Sustainable development.

II. DETAILS EXPERIMENTAL

2.1. Materials and Procedures

2.1.1 Goal and scope

The principle aim of this paper is to evaluate the environmental impacts of canned fish production based on data from a canning plant in Samut Sakhon, Thailand by setting functional unit 1 ton of frozen fresh fish (excluded residues) entering processes.

Figure 1 depicts scope of the gate-to-gate Life Cycle Assessment which considers all production covering raw material preparation, packaging in container, sterilization, and labeling.

It addresses direct environmental impacts from processes such as emitted pollution from the production process resulting from the activity of using resources. However, it does not consider indirect environmental impacts such as wastewater treatment or emissions from other energy production.

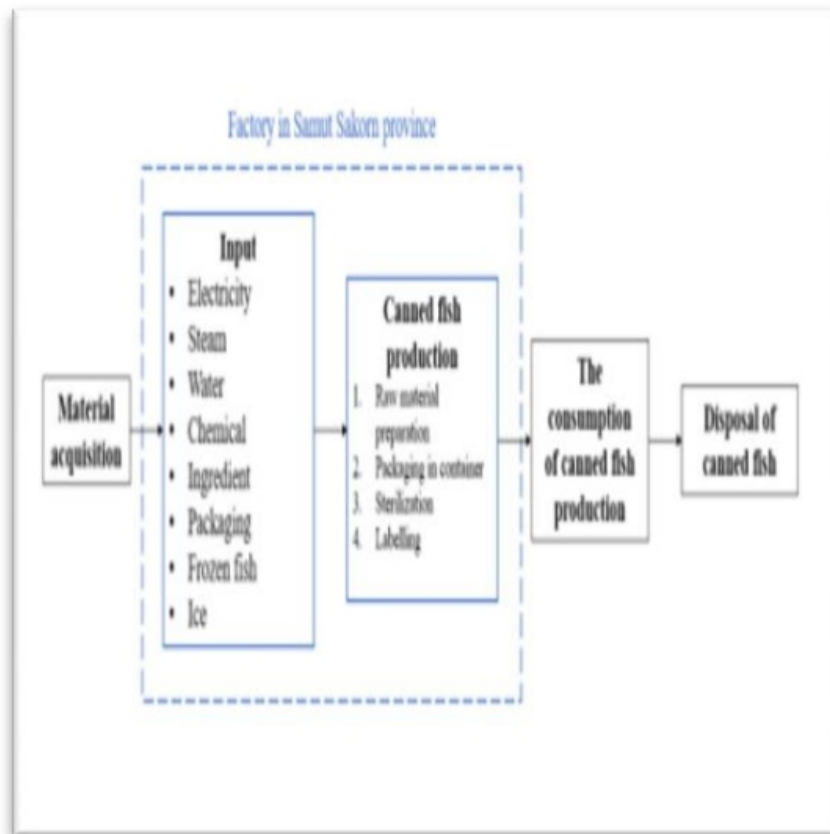


Fig.1. Scope of study

2.1.2. Life Cycle Inventory (LCI)

The primary data contained the main inputs and outputs of canning factory in Samut Sakhon, Thailand covered 12 months in 2021:

the consumption of electricity, water, steam, chemicals, ingredients, and packaging. Secondary data regarding emission factors in all impact categories were taken from the Ecoinvent database, Thai National Life Cycle Inventory Database and Technology and Informatics Institute for Sustainability (TIIS).

Nonetheless, this study excludes calculations from the support system, such as wastewater treatment, solid waste recycling, and water softening, except for steam and ice production.

Every input-output inventory is mass allocated, which is typically used when all products derived from a system have a unit value that does not differ significantly and are not energy products (MTEC, 2012).

The inventory is shown in table 1.

Inventory	Detail	Quantity in 2021	Quantity per 1-ton fish production (without residue)	Unit
Input	Water	37,049,000	14,375.90	kg
	Electricity	2,088,974	688.61	kWh
	Steam	2,532,529	834.82	kg
	Printed label	74,526.58	28.93	kg
	Tin plate	1,140,842.66	442.80	kg
	Board box	338,075.80	131.22	kg
	Fish	4,155,572.47	1612.90	kg
	Ice	831,114.49	200	kg
	Tomato Sause	231,019.11	89.67	kg
	Flour	158,843.39	61.65	kg
	Salt	76,633.98	29.74	kg
	Sugar	85,575.36	33.21	kg
	Soybean oil	28,663.37	11.13	kg
	Output	Canned fish	37,889,422	14,706
Wastewater*		168,181.70	65.28	m3
Fish residue*		977,839.11	612.90	kg
Tank**		51,175	19.86	kg

Table 1: Input-output inventory of processes

Fish residue is recycled to make dried fish, and wastewater is recycled in the cleaning floor, so both are tracked and collected; however, recycling is not considered in the assessment, and the emission factor is assumed to be zero. (TGO, 2019).

Due to emission factor data limitations, this study did not calculate the environmental impacts of tank and plastic waste.

2.1.3. Life Cycle Impact Assessment (LCIA)

The environmental impacts were calculated using data from the life cycle inventory and SimaPro software version 9.0.0.35 with the CML2 baseline 2000 method, with category indicators at the mid-point level (problem oriented approach) covering acidification potential (AP), ozone layer depletion potential (ODP), abiotic depletion potential (ADP), global warming potential (GWP), eutrophication potential (EP), photo-chemical oxidant formation potential (POFP), freshwater aquatic ecosystem potential (HTP).

2.1.4. Interpretation

The environmental impacts of canned fish production were examined in both the characterization and normalization steps to determine the production's greatest impact.

III. RESULTS AND DISCUSSION

3.1. Characterization

In this impact, steam consumption is primarily the highest as shown in figure 2. The primary cause of human toxicity was incomplete combustion of parawood in steam and fly ash dumping, both of which caused respiratory system problems (Yamsorn, 2017). The characterization results suggest emissions to atmosphere are the major contribution to human toxicity.

3.1.1. Human toxicity

In this impact, steam consumption is primarily the highest as shown in figure 2. The primary cause of human toxicity was incomplete combustion of para wood in steam and fly ash dumping, both of which caused respiratory system problems (Yamsorn, 2017). The characterization results suggest emissions to atmosphere are the major contribution to human toxicity.

3.1.2. Marine aquatic ecotoxicity

Tinplate consumption has the greatest impact on can packaging as shown in figure 2, which is essentially a steel product because it is light gauge steel strip coated with tin on both surfaces and as an agent to remove carbon-based contamination from metal. Metals can be transported in dissolved form or as particulate matters.

Another significant cause of marine aquatic ecotoxicity is the combustion of wood to generate steam, which produces polycyclic aromatic hydrocarbons (PAHs), one of the most significant environmental pollutants. They are commonly produced as byproducts of combustion processes (D.Alvarez Munoz, 2016).

3.1.3. Global warming

In this impact, electricity consumption is primarily the highest contributor as shown in figure 2. Gredmeta, 2016 covered that the global warming category was the main impact category of provincial electricity production, and the global warming category's results of this study primarily caused by electricity. Electricity from machines, especially from froze fish before entering the processes and Para wood to produce steam are the main causes in global warming category.

3.1.4. Freshwater aquatic ecotoxicity

In this impact, tinplate consumption is responsible for the highest impact as shown in figure 2. High metal concentrations, even of essential metals, can have a negative impact on freshwater ecotoxicity due to consumption tinplate packaging (Society of Environmental Toxicology and Chemistry, SETAC, 2020).

3.1.5. Terrestrial ecotoxicity

In this impact, steam consumption is primarily the highest as shown in figure 2. Due to burning wood in steam production, burning process produces polycyclic aromatic hydrocarbons (PAHs). Moreover, terrestrial ecotoxicity is dominated by steam during the conversion process (Borrion et al., 2012).

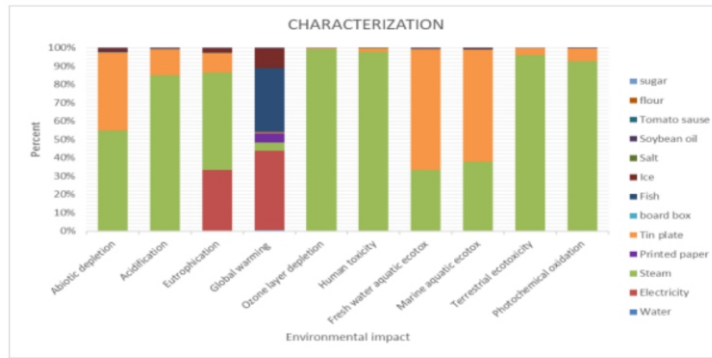


Fig.2. Result of characterization step

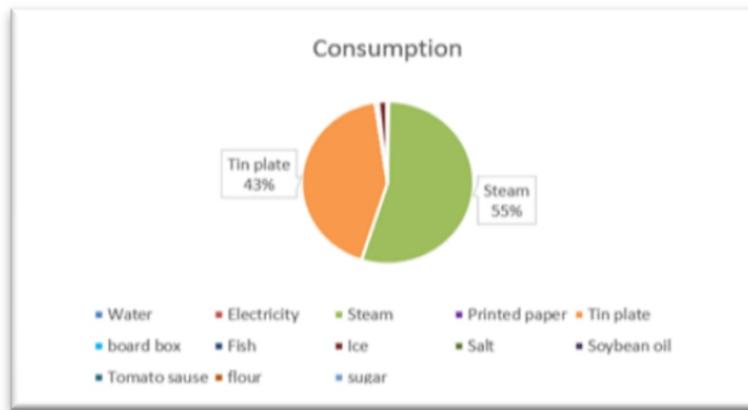


Fig.3. Overall percentage of input consumption

3.2. Normalization

There are five significant impact assessments in canned fish production followed by human toxicity (6.65E-11 Pt or 41.7%), marine aquatic ecotoxicity (4.68E-11 Pt or 29.3%), global warming (2.30E-11 Pt or 14.4%), freshwater aquatic ecotoxicity (1.10E-11 Pt or 6.91%) and terrestrial ecotoxicity (1.01E-11 Pt or 6.34E%), respectively as shown in figure 4.

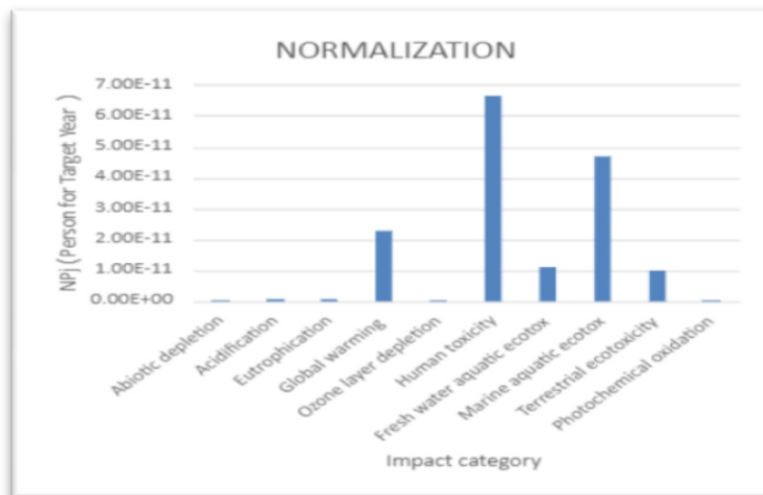


Fig.4. Result of normalization step

IV. CONCLUSION

The results of this study suggest that when compared to all other categories, the five greatest environmental impacts are human toxicity, marine aquatic ecotoxicity, global warming, freshwater aquatic ecotoxicity, and terrestrial ecotoxicity, respectively. The consumption of steam and tinplate had the highest overall impact percentages of 55% and 43%, respectively, and should be improved in the production.

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MUSIC THERAPY FOR SLEEP DISORDERS CAUSED BY ANXIETY AND DEPRESSION

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ABSTRACT

Sleep is one of the important part of our life. The majority of people with long term sleep problems have insomnia. It is the result of a physical illness, chronic pain, stress, depression, anxiety obsessive-compulsive ruminations, panic attaches, past traumatic stress disorder, or drag or alcohol abuse. Prolonged inability to obtain adequate sleep is an unhealthy sign. Music Therapy plays a powerful role in increasing and balancing the general immunity of the patient and orientation him towards healthy life. It can uplift the mood and its positive effect on the physical and mental symptoms of the patient, due to which amazing symptomatic changes can be noticed in patients. The patient becomes mentally balanced, free from anxiety and depression and enjoys better sleep.

Keyword - Music, Therapy, Anxiety, Depression, Health

I. SLEEP DISORDERS

All living exhibit cycles of rest and activity, which in humans are represented by the daily sleep cycle. This sleep wake cycle that corresponds to his or her optimal degree of physical, mental, and spiritual well being. Studies show adequate sleep enhances attentiveness, concentration, mood and motivation. In the modern 21st century, there is no rule for sleep, regardless of how important sleep is for the body. Due to deep sleep, the brain develops an alpha state of mind. During sleep the filtration of waste material from our kidneys are enhanced. During sleep the excessive heat of our body is emitted out and the blood pressure and the body temperature are controlled and balanced sleep is a biggest remedy for gaining back our wasted energy level i.e. rejuvenation of the body and gaining the vital capacity.

The majority of people with long term sleep problems have insomnia. They have trouble falling asleep or staying asleep, or they awaken after few hours of sleep and cannot go back to sleep. The day time results of insomnia are fatigue, the desire to nap, impaired ability to concentrate, impaired judgment, and a lack of zest for life although insomnia may be related to a disease or injury in the brain's sleep centers, most after it is the result of a physical illness, chronic pain, stress, depression, anxiety obsessive-compulsive ruminations, panic attaches, past traumatic stress disorder, or drug or alcohol abuse. Sometimes, as a result of insomnia, individuals have a difficult time staying awake during the day.

II. PARASOMNIAS - ACTIVITIES THAT INTERRUPT RESTFUL SLEEP

Parasomnias occur in many forms and have the potential to interrupt restful sleep. Nightmares are dreams that arouse feeling of fear, terror, panic, or anxiety.

III. SOMNAMBULISM

This (Sleepwalking) is a condition occurring primarily in children and often associated with anxiety,

fatigue, stress. The person performs motor activity, usually leaving bed and walking around, while sleeping and having no memory of it on awakening. Other vigorous behaviors, such as punching, kicking, and night terrors (episodes) that begins with a loud cry followed by rapid heart rate, sweating, and feelings of panic)also interrupt sleep.

IV. SLEEPAPNEA

State of troubling or interrupted breathing while sleeping) sleep apnea, in which individuals stop breathing while sleeping, typically, breathing resumes within 30 seconds. There are many reactions in body such as rapid heartbeat, excessive heating, diarrhea, indigestion, headache, weakness etc., along with feeling of anxiety, depression, frustration and anger this reaction are result of this process by which body face stress. Insomnia creates the imbalance in the body due to that various type of autonomic symptoms occur in body such as depression, anxiety and irritation which can cause psychosis. Some people turn to alcohol, sleeping pills, tranquilizers (anti anxiety agent/drug) and other drugs, however, they offer only short term symptomatic refer for sleep disorders. Without a holistic approach and fundamental changes in one's lifestyle and attitudes, relying on drugs to restore natural sleep rhythms may be harmful and may lead to physical dependency and habituation. The majority of sleep problems repress some form of within ourselves or with our surrounding. Restoring hormone is a way to return to our mental rest activity cycle. This can be accomplished by employing mind-body health practices such as music therapy, meditation, exercise and proper nutrition for extreme sleep disorders, professional help should be sought. "If your sleep is bad, the surest way to make it worse is to worry about it. Remember that older people need less sleep than those who are growing or using up their vital energies n bottling with life and that there are many ways to overcome insomnia without recourse to sleeping pills."1 "There are various physical impediments to good sleep which can be eliminated; that it is possible to learn how to improve the quality of sleep and to overcome dependence on sleeping pill through certain yoga exercises and absences."2

V. ANXIETY

Fear is a powerful emotion that arises in restorations. Everybody experiences fear. The purpose of fear is alert you to take mutative action-usually to light, fee, or seek assistances. If fear is the response to an imaginary situation-usually something in the future that has not yet happened. "Anxiety is a generalized mood condition that can often occur without an identifiable triggering stimulus.

As such, it is distinguished from fear, which is an emotional response to a perceived threat. Additionally, fear is related to the specific behaviors of escape and avoidance, whereas anxiety is related to situations perceived as uncontrollable or unavoidable."3 "Anxiety is a physiological and psychological state characterized by cognitive, somatic, emotional, and behavioral components. These components combine to create the painful feelings that we typically recognize as uneasiness, apprehension, or worry. When anxiety becomes excessive, it may fall under the classification of an anxiety disorder. Anxiety is often described as having cognitive, somatic, emotional and behavioral components."4

VI. SYMPTOMS OF ANXIETY

A person with a phobia invariably knows that a fear is irrational and illogical, yet is unable to control of feeling of anxiety even when thinking about the fear object or situation. Phobias are often triggered in childhood by a frightening event that may not be consciously remembered.

VII. GENERALIZED ANXIETY DISORDER

"Is characterized by persistent and excessive worry and feeling of anxiety only in the last 20 years has the

diagnosis of generalized anxiety disorder been recognized as a mental disorder. however, generalized anxiety disorder now has its own set of diagnostic criteria.”⁵

Excessive worry and anxiety over work or performance that has continued for at least six months.

The anxiety must be accompanied by at least three of the following restlessness or being on edge, fatigue, difficulty in concentrating, irritability, muscle tension, and problems of sleeping (insomnia).

The anxiety is not due to the effects of any drug (legal or illegal) and is not caused by a physiological condition (e.g., hyperthyroidism).

VIII. DEPRESSION

There is no general consensus among the authorities regarding the relation of depression to normal mood swings. Kraepelin and his followers, consider depression a well-defined disease, quite distinct from normal mood. They postulate the presence of a profound biological derangement as the key factor in depression. “The term depression is often used to designate a complex pattern of deviation in feelings, cognition and behavior that is not represented as a discrete psychiatric disorder. In such instances it is regarded as a symptoms-complex. The cluster of signs and symptoms is sometimes conceptualized as a psychopathological dimension ranging in intensity (or in degree of abnormality) from mild to severe.”⁶ Music is an activity which can contribute towards physical development in a variety of ways by relaxing muscular tension, developing co-ordination of mind and body, providing an outlet for emotional tension and an opportunity for creative self-expression. “In general, stress is related to both external and internal factors. External factors include the physical environment, including job, relationship with others, home, and all the situations, challenges, difficulties, and expectations confronted with on a daily basis. Internal factors determine body's ability to respond to, and deal with, the external stress-inducing factors. Internal factors which influence one's ability to handle stress include nutritional status, overall health and fitness levels, emotional well-being, and the amount of sleep and rest. defines stress as the state manifested by the specific induced changes within a biological system.”⁷ Stress is the subjective feeling that is produced by events that are perceived as overwhelming and beyond one's control. 'Stress involves a sufficiently potent danger to psychological or physical wellbeing; may also lead to disordered behaviour, anxiety or other emotional disturbances. “When strain goes beyond limit, our mental balance is disturbed and this disturbance effects our body too. According to psychiatrics, mental stress is there behind diseases like anxiety, depression, hysteria and panic etc.”⁸ Depression is characterized by feelings of helplessness, hopelessness, reduced interest in enjoyable activities, and a variety of other symptoms. Depression can occur as a normal response to the loss of something that a person values. Whenever an individual experience a loss, it is normal to feel sad and depressed, and to grieve the loss. Sadness and grief are the human spirit's way to heal the hurt of loss and open the way for new attachments. When depression is associated with a loss, the depressed individual may be simultaneously aware that the experience is transitory and along with grief, feel that there is hope for the future. This kind of depression tends to lift after the grieving ends. In contrast to the “normal” depression that may accompany loss, some people experience a long-lasting depressive state or periodic episodes of deep depression that are not self-limiting and may hinder and even jeopardize a person's life. These depressions may be a response to a stressful, severe psychological trauma, injury or disease.

IX. MUSIC PROMOTES MENTAL HEALTH ENABLING TO MANAGE SLEEP DISORDERS

Harmonic resonance is a way to restore balance, harmony and vitality by offering music and sounds that resonate with you in such a way as to present a musical model of you in your optimal, vibrational, and resonant state. Music of many different genres can help enhance the mind/body connection. Healing mantras, chants, and incantations have ancient and obscure origins but are seen throughout history and in

every major world culture-Hinduism, Muslim, Judaism, Native American, Polynesian, Asian, Sufi, etc. The power of chant involves bridging the two worlds of humanity and eternity.

It allows a person to touch a deeper world that is organic and flowing. Chant has no set rhythm and is based on the breath in combination with tonal patterns of sustained vowels. “Music has been observed by Sharma, Mamta (2000) that tranquil music can ease both physical pain in humans, and psychological disturbances caused by abandonment, abuse, loneliness, sadness, different traumas or any other negative emotions.”⁹ In addition, music can help cure headache, abdominal pain and tension. Music is one of the most effective ways of controlling emotions, blood pressure and restoring the functioning of the body.

Listening to music helps control negative aspects of our personality like worry, bias and anger. “Desirable effects of music have been described by Copland, A, (1960) as 'it can stimulate or sooth the mind, help towards a wider education or at least a wider mental perspective, can gently plough the mind to be more receptive to learning, discipline physical action, comfort the lonely and the sick, awake, pleasant memories in the old, delight the young, and lull the child to sleep.’”¹⁰ When changes are brought to the brain, its effects can be noticed in the body also. It brings marked changes in the breathing and heart rate which are controlled by the autonomic nervous system. Music can be a helping tool in chronic stress by calming the mind and ensure relaxation. The heartbeat tends to speed up and slow down depending on the volume and speed of the auditory stimulus. Listening to the low tempo music slows down breathing and heart rate, resulting in good health. “Music helps bringing changes in the state of mind. One can get rid of depression by developing a positive state of mind, thus preventing body from its harmful effects. It can also lead to an increased level of creativity and hopefulness.”¹¹ “Music helps in fighting depression and stress. Depression reduces brain activity and hampers the mind's ability to plan and carry out tasks. According to Goodman, K.D (2011), lack of the neurotransmitter, Serotonin, results in a depressed state of mind Soothing musical notes help increase the Serotonin levels of the brain, thus alleviating mental depression.”¹² Instruments like Sitar, Santoor and Sarod, flute etc. are recommended for the enhancement of concentration and memory. Classical music improves the ability to recall what's retained in the brain in the form of memory. Strong beats cause the brain waves to resonate in synch with the beat, thus leading to increased levels of concentration and increased mental alertness. “According to Sairam, T V (2005) 'present day music therapy practice involves use of Archika, Gathika and Samikaverses (Vedic versions with single, two and three notes respectively) to enhance focused attention and to improve concentration and to help get into meditative and relaxed states.

These recitals called Proto Ragas are used in special education settings for children with special needs in the process of mental developments, behavior and personality trait. With these Ragas and rapid rhythms, special children respond readily and more quickly”¹³ “The system involves deep listening to the body inner sounds and music acoustics of the external worlds which are termed as Ahatnaad Anahatanaad. It integrates meditation techniques and certain Hatha Yoga practices conducive to sonic exploration. Most of the modern Indian music therapy approaches use Ahata music as a therapeutic and a prophylactic medium in clinical and educational settings”¹⁴ “In Indian music, the raga pattern has a well-formed sequential, character, including the characteristic multiple sub-tones with phrases in between, causing the neural network to respond, bringing about the desired effect on mind.”¹⁵ The music of India is said to be one of the oldest unbroken musical traditions in the world.

It is believed that listening to Indian music brings about a positive approach to life by enhancing the level of thinking, aesthetic sense, moral values, and promotes healthy lifestyle and a relaxed and refreshed motion in a person. Our mind easily becomes absorbed in sound. This is why everybody-even infants and animals-enjoys listening to Music. “Music exercises the brain and playing the instruments for instance, involves vision, hearing, touch, motor planning, emotion. symbol-interpretation – all of which go to activate different areas of brain functioning. It has been observed that some Alzheimer patients

could display music even long after they had forgotten their near and dear. In the deepest and most general level, the forms of music stimulate the forms of adaptation (that is assimilation and accommodation) which are deeply rooted in our autonomic nervous system. These intimate connections between our life-processes and music can remain despite illness or disability and are never dependent on our musical skill or mastery. Because of this. the emotional, cognitive and developmental needs of people with a wide range of problems arising from such varied causes such as learning difficulties. mental and physical ailments, physical or sexual abuse, stress, terminal illness etc., can be rationally addressed by selecting appropriate music.”¹⁶

X. CONCLUSION

Music as an alternative therapy plays an important role in managing sleep disorders caused by Anxiety and Depression subject to the expertise of music Therapist

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