

Assessing Physicians' Awareness of Eosinophilic Esophagitis on the Treatment and Diagnosis of Patients

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Abstract

Eosinophilic Esophagitis (EoE) is a somewhat rare allergy and autoimmune disease that has only surfaced in the past two decades. However, there is cause for concern as the numbers of those diagnosed are exponentially increasing and physicians and medical technology are seemingly unable to advance with it. All previous research done on EoE has been focused on the physiology of the condition. This paper aims to understand how well physicians are versed in the diagnosis and treatment guidelines and juxtapose that to the personal experiences from adult patients and parents of pediatric patients. Surveys were distributed via Survey Monkey, a website designed to aid in the distribution of web-based questionnaires. Patient's surveys were placed in two closed online support groups for people diagnosed with Eosinophilic Esophagitis. Medical professional surveys were given to various medical institutions (Memorial Regional Hospital, Nova South Eastern Medical School, the University of Florida Medical Program, as well as Yale New Haven Hospital). Results from the surveys supported the hypothesis that the lack of knowledge of medical professionals relating to EoE is negatively affecting the initial diagnosis of the disease. Once a confirmed diagnosis is made, it is shown that medical professionals are adequately prescribing and carrying out treatment plans that are beneficial to the patient (as shown through cleared endoscopic biopsies, and/or lessened symptoms).

Keywords: Eosinophilic esophagitis; Allergy condition; Autoimmune condition; Physician awareness; Pediatric patients; Gastroenterology

Introduction

Eosinophilic Esophagitis (EoE) is a chronic allergy/immune condition that is usually characterized by the inflammation of the esophagus in response to an abnormal build-up of eosinophils, or white blood cells [1]. Esophagus is a tube in the throat that connects the pharynx to the stomach and serves as a passageway for food from the mouth to the stomach. In the body, white blood cells play an extremely crucial role in fighting infection. Eosinophils, in particular, help protect your body from harmful bacteria as well as from parasitic infections. They contain granules which have molecules designated to eradicate anything the immune system specifically marks to destroy. Eosinophils are located primarily in the bone marrow and bloodstream and from there travel to the lungs and lining of the gastrointestinal tract. However, in EoE, eosinophils are found in the esophagus. This abnormal build-up can result in detrimental effects to patients. It can potentially cause poor growth (failure to thrive), chronic pain, and oftentimes dysphagia (trouble swallowing). Because EoE is an allergy mediated response, most patients have food allergies, some of them severe enough to result in anaphylactic shock.

EoE is a disease that most physicians are unfamiliar with. It is becoming a near "epidemic" as the numbers of diagnoses are exponentially increasing. This condition now affects approximately 1 in every 2,000 people in the United States and European countries [2]. EoE affects a person in all demographics but most frequently diagnoses are made in individuals with the mean age of 33.5 years old. Males are three to four times more likely to have the condition than females the

reasoning for this is yet to be discovered. The medical journal, Clinical Gastroenterology and Hepatology, conducted a study of 35,575,388 patient's health insurance claims from 2008 to 2011 from which they determined that 16,405 patients (.00046%) had a diagnosis code for EoE. Out of the subset that was examined, 24 percent were 18 years or younger [3]. Both the understanding and management of the disease is still very much in its infancy. Because of this, there still exists a lack of knowledge about this condition. Physicians most often misdiagnose EoE for another condition known as Gastroesophageal Reflux Disease (GERD) which presents with some of the same symptoms that EoE does. Symptoms such as reflux, dysphagia, burning sensations, and nausea, which are usually found in both conditions, are the cause of most cases of misdiagnosis. This hinders patients from successfully treating and managing their symptoms. Unfortunately, prolonged treatment related to a misdiagnosis can result in more severe bodily damage.

Literature Review

An NCBI article, Epidemiology of Eosinophilic Esophagitis, published in 2010 provided a survey to physicians asking about how they would choose to treat a patient with EoE and what they would expect the prognosis to be [4]. The survey distributed in this experiment replicates some aspects demonstrated by the NCBI paper such as the initial gathering of demographics at the beginning of the survey. Many of the symptoms given as answer choices are the same in both surveys (dysphagia, abdominal pain, food impaction, nausea, etc.). The goal of the survey was to analyze the treatment plans of physicians against the current guidelines and procedural standards at the time. Though the research was conducted well, the results were less than ideal. "The majority of all gastroenterologists surveyed (60%) do not use the currently recommended 15 eos/hpf as their cut-off point

for a diagnosis of EoE" [4]. It was apparent that the physicians strayed from the current guidelines and continued to prescribe the same two or three treatment options. The researchers advocated the need for a better educational understanding of the disease. The expectation for the study in this experiment is that the research conducted will not only be able to replicate some aspects of this NCBI survey, but the responses will be somewhat similar.

The World Allergy Organization conducted a study in an attempt to better understand the complexity of EoE. More specifically, the prevalence in the United States and how that might affect treatment plans. Some of the methods in this article contributed to the way that both of the EoE surveys were formatted and distributed. The information that came from this source greatly cleared up some discrepancies between the favored treatments methods to most efficiently manage the condition. The study looked at 200 respondents who answered to an online survey which was sent to the following influential online peer-reviewed medical journals: World Allergy Organization, American College of Allergy, Asthma and Immunology, and American Academy of Allergy, Asthma and Immunology. By distributing the survey to such a wide variety of reputable journals, the information learned from the study was invaluable to the medical community. This is a crucial aspect that will be duplicated in the study assessing the knowledge of EoE from physicians and medical/nursing students.

Another study was done by engineers at the University of Utah (UU) to examine just how effective the biopsy is. A biopsy of esophageal tissue is one of the most common means of diagnosis. A biopsy is obtained by performing an esophagogastroduodenoscopy (EDG) which allows for visualization of the esophagus and stomach for the purpose of obtaining samples of tissue throughout the gastrointestinal tract. The tissue samples are then taken to pathology where it is processed and examined thoroughly. Scientists, meticulously count the number of eosinophils per sample take-in. When the eosinophil count hits 15 or higher, a diagnosis of EoE can be made. The study at UU was conducted to see how it is to perform an EGD for the purpose of biopsy and the role that it plays in the potential diagnosis of EoE. After examination of thousands of biopsy slides, the team came to the conclusion that biopsy is an effective method of diagnosis however it is not the most reliable. In their results, they found that in patients who were known to have EoE, if specific parts of their esophagus were sampled, it would appear as if they were no notable abnormalities [5]. This lead to the conclusion that physicians could be misdiagnosing as many as one in every five patients. Although the research currently being conducted is not as biological in comparison, it explores the physician's preferred method(s) of treatment which are then compared with the feedback of patients and if they felt as if those treatments were beneficial or if they showed any indication of improvement in regards to their symptoms.

An instrumental aspect of this study was an article published by Wiley Online Library, a reputable peer-reviewed scientific journal. This study looked at various patients who were diagnosed with either Gastroesophageal Reflux Disease, EoE, or Proton Pump Inhibitor-Responsive Oesophageal Eosinophilia (similar to EoE, however the condition achieves complete remission upon treatment utilizing PPI). Very similar to the research being conducted in this mixed qualitative/quantitative survey distributed to different support groups, the research will include the various techniques used to treat and manage EoE. The criterion for someone being diagnosed is also the same in both surveys (eosinophil count higher than 15 in the esophagus upon

biopsy) [6]. However, unlike Savarino and his team's research, this study's survey administered to medical professionals will not be verifying the effectiveness of multiple procedures done to monitor the progression of the condition [7]. Instead, identifying treatments used to manage the disease in comparison to feedback from patients detailing how well they worked for them. The excerpts from the study that explain the different methods of management and individual benefits and disadvantages they hold, are particularly helpful in the overall understanding of treating Eosinophilic diseases.

Methodology

This research serves to better understand the relationship between the knowledge that medical professionals have about EoE and the effect it has on how the patients are being diagnosed and treated. This research employed a mixed quantitative and qualitative survey that utilized both multiple choice answers and comment boxes to gain statistical evidence as well as anecdotal evidence. To reach an optimum sample size, all surveys used in this project were developed through surveymonkey.com, an online platform which specializes in the distribution of web-based surveys and questionnaires. Prior to the collection of data, an institutional review board (IRB) read and approved the intentions of the research and the proposed methodology that was associated with it. The researcher hypothesized that upon the collection of this data, a considerable lack of knowledge would be found among medical professionals and in turn would have negative effects in the manner patients are diagnosed and treated.

Surveys one and two: Patients 18+/Parents of pediatric patients

These two surveys are nearly identical, with the only difference being pronoun usage in the questions. The 18+ patients will have "you" or "your" while the pediatric survey will read "your child's". The purpose of separating the surveys was not only to gauge if the information given is different in pediatric patients juxtaposed to diagnosed adults but to avoid the consensual prerequisites that come with distributing the survey to minors. The first question contains terms and conditions that are associated with participating in this survey. Should they choose to accept, participants will then be directed to the next set of questions. The following question is a demographically based question that serves to determine the average age at the time of confirmed diagnosis. The next question asks people which symptoms they experienced that led them to seek medical attention. They are then presented with a list of common symptoms with instructions to choose all the symptoms that pertain to their experience. This information will be compared to the answers given to a similar question given in the third survey. Following this question, they are asked to disclose the allotted amount of time that passed from the first presentation of symptoms to the time of the diagnosis.

The remaining questions are to gather anecdotal information about various treatments that the patients and their families tried, to what extent they helped with the management of the disease, and if they felt their physician is/was well versed in the guidelines of EoE. The aim of this was to discover any cases of misdiagnosis, and various treatments physicians may prescribe that are not effective to the majority of patients. These surveys will be distributed via support groups for the disease on Facebook, as well as through the CURED foundation (Campaign Urging Research for Eosinophilic Disease) that is goal oriented on funding research to look for a cure.

Survey three: Medical professionals

The last of the three surveys administered were generated for people who have occupations in the medical field, or those currently enrolled in schooling to do so. This survey consisted of 10 questions (6 multiple choices, 4 fill in the blank). The first page consisted of one question asking for the participant's consent, preceding information about how the results will be used, as well as privacy policies administered by Survey Monkey. The succeeding four questions are demographically based, serving to gain information about the participants. The sixth question of the survey is imperative to the research and filling the respective gap. Medical professionals will be asked to respond to the following statement so that it best describes them, "I am familiar with Eosinophilic Esophagitis". Using the Likert scale, each person will respond with answers ranging from "strongly agree" to "strongly disagree" to accurately represent how well versed they feel they are in regards to EoE.

The survey then goes on to ask the medical personnel what, if any, experiences they have with the disease (i.e. having a patient with EoE, learned about EoE in medical or nursing school, EoE was taught at a continuing education seminar, they read a journal article about EoE, a discussion with a peer regarding EoE, not applicable, and an "other" comment box).

The eighth question is extremely instrumental when compared to responses from the other two surveys. This question asks respondents what symptoms they would believe is a reason to consider the diagnosis of EoE, they are provided with a list of common symptoms that most patients present with, which are similar to other common conditions. This question is aiming to see what medical professionals would label as a "red flag" in an undiagnosed patient and will be compared to the other surveys in which patients will be given the same list of symptoms, and are asked to select which symptoms led them to seek medical attention. This will determine if there are any discrepancies in what medical professionals are looking for when considering a diagnosis of EoE and with the symptoms of patients who are already diagnosed.

This could also potentially identify why there is such a high rate of misdiagnosis with this condition. The final two questions of this survey are extremely similar. They are both free response which calls for the respondent to create a hypothetical treatment plan for the patient to better manage their disease. These responses will also be compared to the other two surveys in which the patients and parents of pediatric patients explain the various treatments they have tried and which ones work overall. This will conceivably determine a better-solidified treatment plan for the general population diagnosed with EoE. This will be distributed across multiple medical institutes via the survey monkey link (Nova South Eastern Medical School (Fort Lauderdale, Florida), Memorial Regional Hospital (Hollywood, Florida), University of Florida (Gainesville, Florida) and Yale New Haven Hospital (New Haven, Connecticut).

Data Analysis

Qualitative data

From the surveys administered there were a total of 16 unique qualitative questions of which the majority of the data analysis will be focusing on. A total of 397 people consented to the terms and conditions of the survey (which was the first question upon entering

the webpage). Following the acceptance of these terms, the participants were then led to the succeeding questions.

Knowledge of EoE in the medical profession

Questions assessing the knowledge and awareness of EoE were administered throughout all the surveys distributed. The sixth question given to the medical personnel utilized the Likert scale and asked participants to agree or disagree with the given statement. On a scale ranging from "strongly agree" to "strongly disagree" the medical professionals were given the following statement, "I am familiar with Eosinophilic Esophagitis." The data collected is as follows (Figure 1).

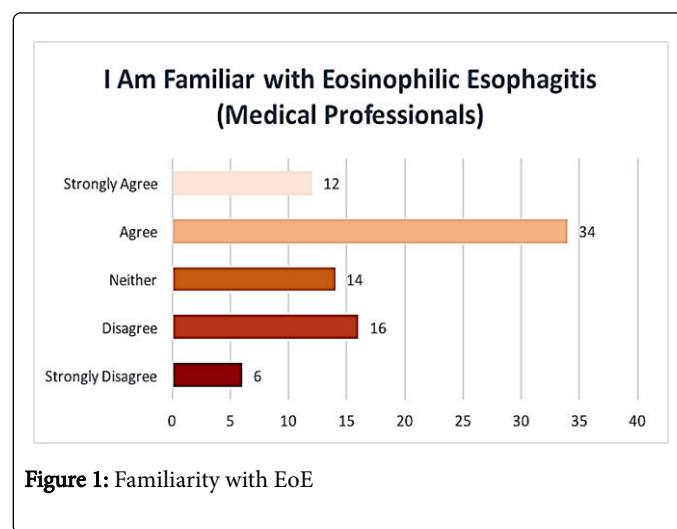


Figure 1: Familiarity with EoE

This data was compared to the sixth question in the survey distributed to the support groups in which the respondents were asked to agree or disagree with this statement, "Your primary care physician is well versed in the symptoms and treatment guidelines of Eosinophilic disease." The medical staff felt as if they were somewhat knowledgeable about EoE as a whole, with 56% saying they either "Agree" or "Strongly Agree" with the statement. The adult patients and parents of pediatric patients responded in a different manner as demonstrated by this analysis of data (Figure 2).

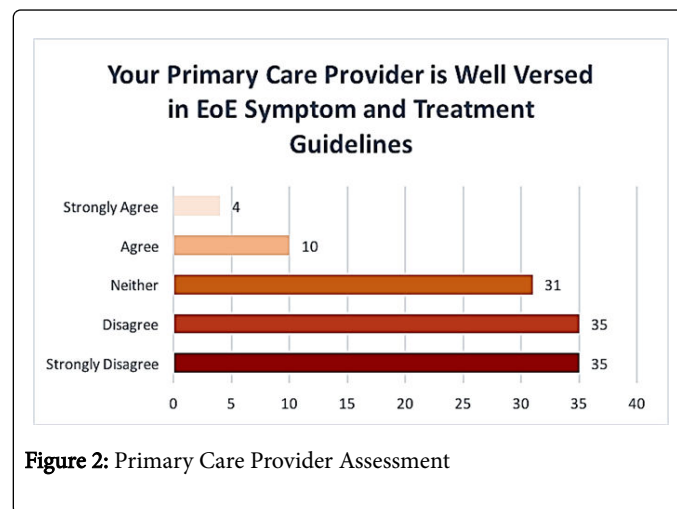


Figure 2: Primary Care Provider Assessment

Approximately 11% of the participants who answered this question believed that their primary care provider (PCP) was sufficiently

knowledgeable in their understanding of EoE symptoms and guidelines in contrast to the 89% who selected “Disagree”, “Strongly Disagree”, or “Neither”. In the seventh question of the Medical Professional survey, respondents were asked to categorize their experience of EoE selecting one of seven options: experience through a patient, learning about the disease in medical/nursing school, learned about EoE through an attendance at a continuing education seminar, read about the disease in a journal or article, introduced to EoE through conversations with colleague(s), no experience, and an “other” category was provided alongside a comment box where participants were able to elaborate should they feel the need to (Figure 3).

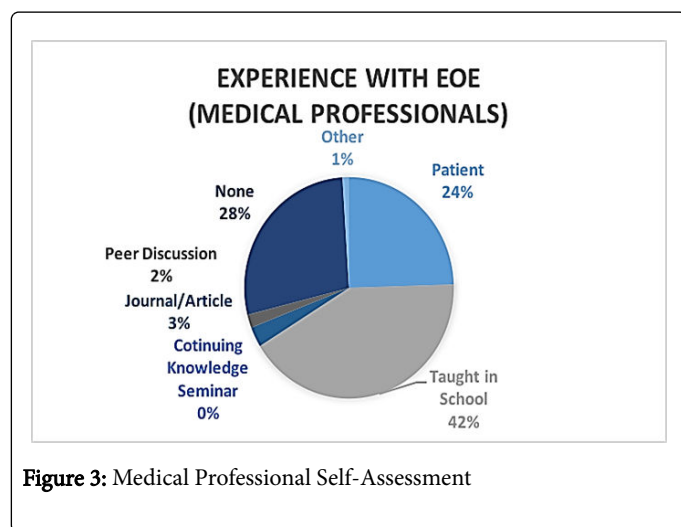


Figure 3: Medical Professional Self-Assessment

Forty two percent of the people surveyed learned about EoE when they went to medical or nursing school. Nearly a fourth of the respondents, 24%, learned about EoE through the caring of their patients. While this data shows that the disease is being introduced in medical and nursing schools as well as through personal interactions, there were still 28% of the personnel who has absolutely no experience with the condition whatsoever.

Diagnosis

Question eight in the medical professional study and question three in the support group study have the same list of answers to choose from in regards to the diagnosis of EoE. In the medical survey, professionals are asked to look at a list of symptoms and pick the one(s) that would most likely cause them to consider EoE as a diagnosis if they were presenting in a patient. These results were then compared to answers from question three on the support group form where they were given an identical list of symptoms and were asked to choose which of those symptoms (or multiple) led them to seek medical attention (Figures 4 and 5). Figure Five is a combination of the Adult Patient and Pediatric Patient survey responses.

When asking medical professionals about what symptoms would make them consider a diagnosis of EoE, the top three responses were: difficulty swallowing (19%), heartburn (13%), and upper abdominal pain (12%). When asking patients and parents of pediatric patients about what symptoms prompted them to seek medical treatment, the top three responses were: difficulty swallowing (16%), vomiting (16%), and upper abdominal pain (13%). Medical professionals should be cautious when dealing with any of the above symptoms, however,

should be paying closer attention to the symptom of vomiting combined with difficulty swallowing and upper abdominal pains.

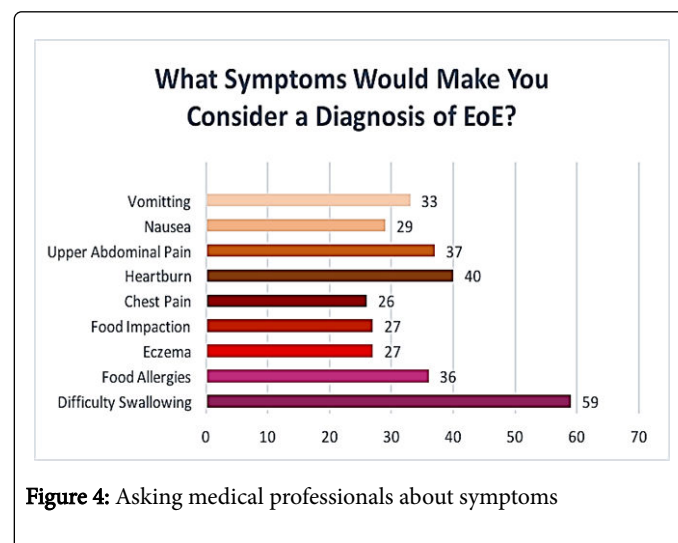


Figure 4: Asking medical professionals about symptoms

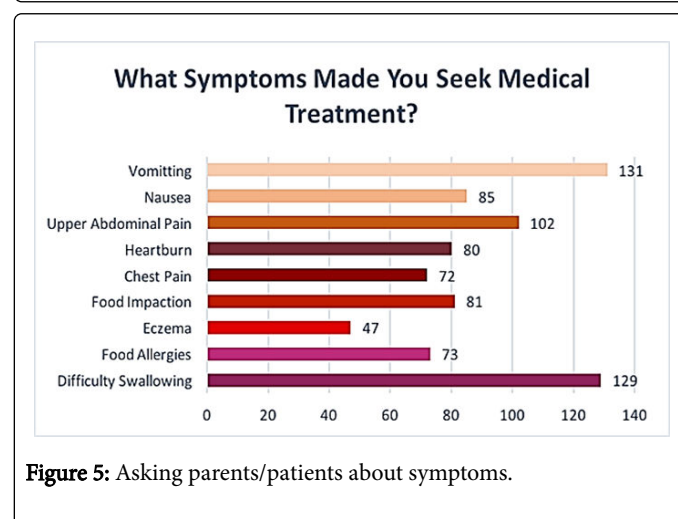


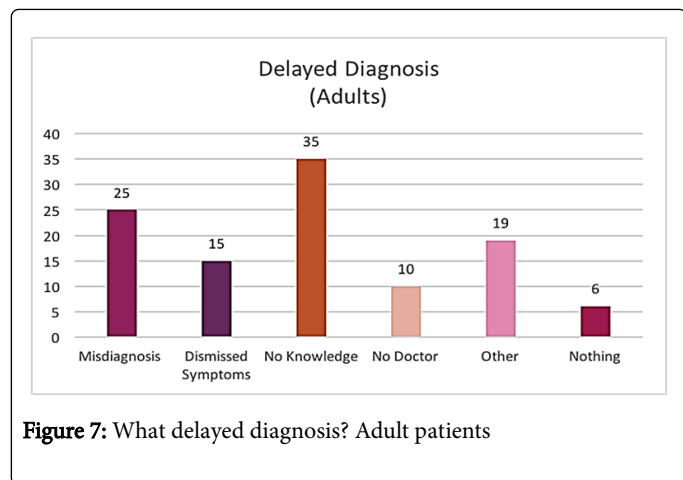
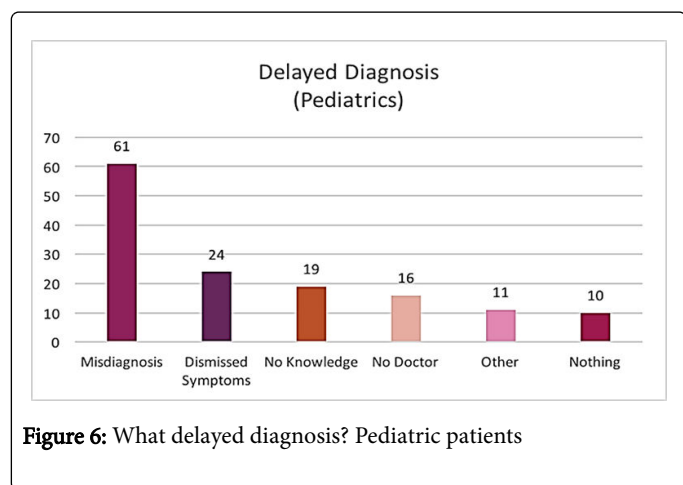
Figure 5: Asking parents/patients about symptoms.

Delayed diagnosis

EoE has been somewhat of a mystery in the medical community. But as the disease progresses, and new diagnoses are continuing to be confirmed, doctors are improving the way that patients get tested in hopes to better be able to treat it. However, there are countless patients that wait for extended periods of time to get treatment for the disease, mostly because they don't know that they have it, or due to a misdiagnosis of a similar disease. In the surveys for the adult and parents of pediatric patients, participants were asked if there was anything that delayed their diagnosis. The answers were given in a comment box where people were free to answer with whatever information they felt was necessary. This data was then categorized into six classes. The first option was “Misdiagnosis”, if respondents chose this, at some point in their journey with an eosinophilic disease, they received a confirmed diagnosis from a physician with a condition other than EoE.

The next category for these answers was “Dismissed Symptoms”, this covered situations when patients felt as if their primary care physician pushed their symptoms to the side, didn't pay much

attention to them, or simply didn't believe that the symptoms were real. One of the respondents even quoted their doctor reporting that they accused the mother of "seeking attention" and the child of "making it up". The third group was labeled "No Knowledge" in which the patients felt as if their diagnosis was due to a lack of knowledge from their care providers. The next categorization was "No Doctor" which was the population that was either unable to reach a specialized doctor in their area or the wait to see one was enough to significantly delay a much-needed diagnosis. Any answer given that could not be filed into one of the previously stated options was put into the "other" category (Figures 6 and 7).

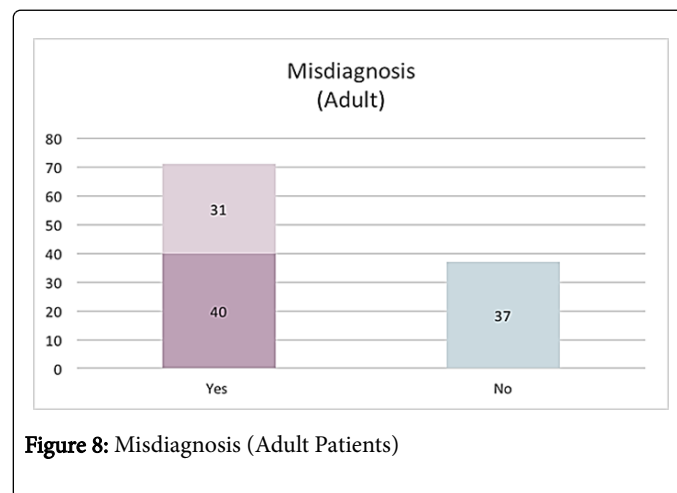


In regards to the pediatric patients, 43% were misdiagnosed with another condition at least once before receiving their confirmed diagnosis of EoE. Only 7% of the 141 participants stated that nothing delayed their diagnosis. However, in the survey assessing the adult patients, the main cause of a delayed diagnosis was a lack of knowledge from the physician with 32% of the 110 responses. 23% of the people said that they were misdiagnosed with diseases including GERD, allergic type conditions, psychological disorders, and others. Less than 6% of the patients said that there wasn't anything that hindered the diagnosis.

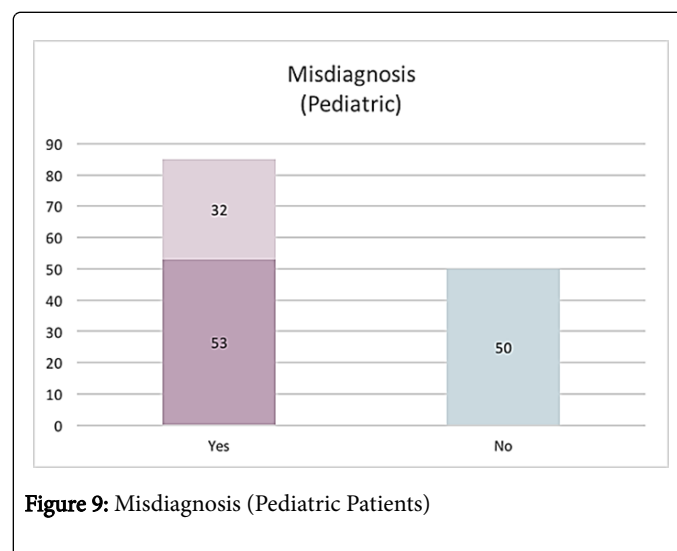
Misdiagnosis

As shown in figure six and seven, misdiagnosis is the leading cause of a delayed diagnosis in both adult and pediatric patients. The tenth

question of the support group survey asked participants if they had ever been misdiagnosed before receiving the EoE diagnosis. This data was compiled and categorized into those who had received a misdiagnosis (of these people who got more than one incorrect diagnosis) and those who did not (Figure 8).



Sixty six percent of the adult patient respondents had at least one instance of misdiagnosis from a physician, and of that population, 44% received more than one incorrect assessment of the condition (ranging from 2-4). Just a little over a third (34%) had the correct identification of EoE as their first diagnosis. The pediatric results were then calculated in the same fashion (Figure 9).



Sixty three percent of the pediatric patients had their physician give them inaccurate diagnosis. Of those sixty three percent, 38% had more than one misdiagnosis while only 37% were immediately diagnosed with Eosinophilic Esophagitis.

Treatment

Because a cure has not yet been discovered for the disease physicians prescribe various treatments in order to better manage the condition. There are four main types of treatments that doctors usually suggest to patients and their families: 1) The elimination diet: identifies foods that produce adverse effects on the body, eradicates them from

daily consumption, and over time individually introduces them back into the diet. 2) Proton Pump Inhibitor (PPI): a prescribed medication which hinders the production of stomach acid which is helpful to manage the majority of EoE symptoms (nausea, vomiting, chest pain, heartburn, and upper abdominal pains). 3) Budesonide is a specific type of corticosteroid that when swallowed coats the esophagus and eliminates a buildup of eosinophils in the esophagus. Steroids work to diminish any inflammation that may be occurring in the body, particularly in the esophagus for the patients affected by EoE. Patients were questioned on the treatment methods that best benefitted them as evidenced by more clear endoscopic biopsy results (a tissue sample collected to count how many eosinophils are in the esophagus) (Figure 10).

field of EoE and are applying that information in how they would treat patients. When asking the patients whether or not their prescribed treatments were effective by way of reduced symptoms or improved biopsy results, 47% of all patients responded as “agree” or “strongly agree”.

Limitations

Although the applied research methods have yielded results that sufficiently fill the gap of information relating to how the knowledge of EoE from medical professionals is impacting the diagnosis and treatment for patients, there are numerous limitations to consider. With any disease, the likelihood of two patients having identical presentation and symptoms of the condition is fractional.

Although the large influx of responses came from the support group surveys, there was a suboptimal amount of entries obtained from the medical professionals (225 patient surveys versus 82 medical professional surveys). Both of these quantity issues came with their advantages and disadvantages. Due to the large amount of patient surveys received, more accurate results were able to be derived. However, it hindered the efficiency of processing the qualitative entry questions. Fitting written answers into one categorization to be graphed proved to be difficult at times. This was solved by having all of the answers individually verified.

Interpretation of the qualitative responses with attempts to fit them into specific categories and maintain objectivity was a limitation in this study. In the same regard, it was efficient to analyse the data provided by the medical professionals, at the mercy of a less represented population size. Accessibility to certain tools was restricted due to the sophomore nature of the research. When attempting to obtain more medical personnel from Yale-New Haven Hospital, the IRB process was required to be completed for a second time with Yale’s qualifications and criteria. Because it was such a rigorous process which would ultimately take weeks and held the possibility of being denied by the committee the research would continue without Yale being one of the primary sources for medical professional responses.

Conclusion

The initial hypothesis had two components: identifying the potential lack of knowledge of medical professionals regarding Eosinophilic Esophagitis, and if discovered finding it to have adverse effects on the diagnosis and treatment of patients. This hypothesis was well supported as evidenced by the correlational data collected. This study focused on finding the gaps in the knowledge of medical personnel and comparing it to data collected from patients. The data from the survey proves the considerable informational shortage in the medical community about the disease and how that is resulting in misdiagnosis, and ineffective treatment plans.

Lack of Knowledge

There was a clear discrepancy in what medical professionals felt their knowledge base of Eosinophilic disease was in comparison to what patients experienced. Eighty nine percent of patients felt that their primary care provider was well informed about the symptoms and treatment options of this disease. This inconsistency in knowledge was supported by the fact that 28% of medical personnel responded that they had no experience with Eosinophilic disease.

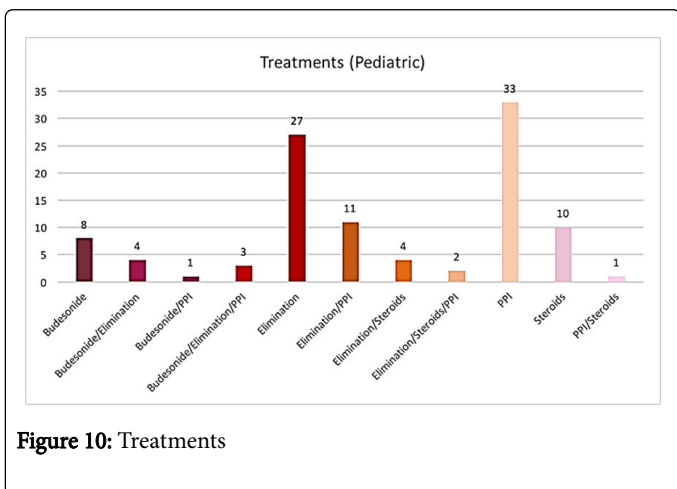


Figure 10: Treatments

In examining the data of pediatric patient’s treatment regimens, 32% of patients surveyed were placed on a PPI for management of their disease, while 26% were placed on an elimination diet. This information was then compared to the medical professional survey in which participants were asked to create a hypothetical treatment plan for someone with EoE (Figure 11).

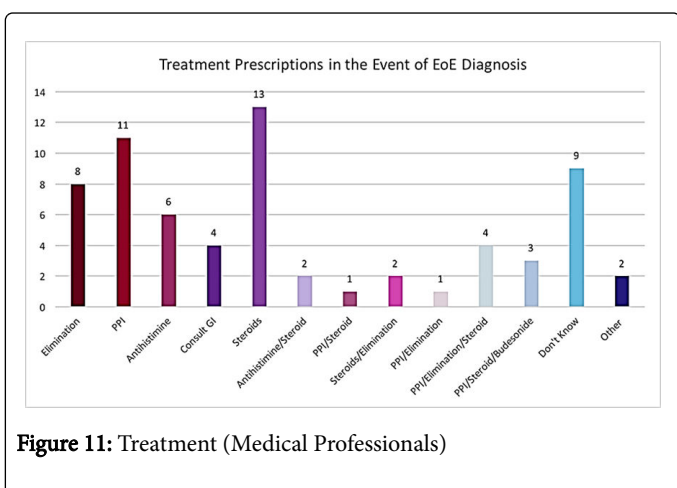


Figure 11: Treatment (Medical Professionals)

Sixty five percent of medical professionals surveyed would utilize a treatment therapy that follows currently approved guidelines. However, 14% of the respondents could not think of a treatment or diagnostic method that would benefit patients diagnosed with EoE. Encouragingly, the responses obtained through this question on the survey show that medical professionals are gaining knowledge in the

Diagnosis

This research heavily supports the fact that there are a number of misdiagnoses surrounding the disease. Since the condition is growing to affect more people every day, it is imperative that medical professionals stay current with diagnosis and treatment guidelines in order to better serve their patients and their families. The data sets found that over 60% of patients are being misdiagnosed at least once, postponing necessary treatment. In addition, patients are oftentimes treated for different conditions which were ineffective and sometimes leading to worsening of symptoms. Interestingly, parents of pediatric patients noted that the delay in diagnosis and treatment was related most often to a misdiagnosis (43%), while the adult counterparts noted that the main cause of delay in reaching a diagnosis was a lack of knowledge by their physicians (32%).

Treatment

This study showed that 65% of medical professionals could identify approved treatments for EoE. In analysing the data of patients as well as parents of pediatric patients, 47% showed improvement in symptoms and biopsy results when treatment guidelines were followed.

Future Research

It appears that EoE continues to be low on the list of differential diagnosis despite the majority of medical professionals being able to adequately identify symptoms and treatment guideline leading to misdiagnosis and delays in treatment. This research and the limitations that were found throughout the course of it are extremely important

when dealing with the future of Eosinophilic Esophagitis. There needs to be more awareness of the disease in providers allowing it to be a consideration when patient present with symptoms consistent with EoE. There is a call from the EoE community, with CURED at the helms, to increase research and knowledge of this condition in order to increase awareness allowing it be brought more into the consciousness of providers and patients alike.

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