Dissertation Academic Paper

Cross-sectional survey on the habits, attitudes and perceived benefits of fish oil supplement use in individuals with rheumatoid arthritis

Student Declaration In Respect of Individual Work

I declare that the whole of this work is the result of my individual effort and that all quotations from other authors have been acknowledged.

Dissertation submitted in partial fulfilment of the requirements of Cardiff Metropolitan University for the Degree of Bachelor of Science with Honours.

Signed:..............................................

Date:..............................................
Abstract

Background – Rheumatoid arthritis is a chronic inflammatory condition and current medication are not totally effective. As a result, many patients use fish oil supplements as a form of complementary medicine. Significant evidence from randomised control trials indicates fish oils elicit therapeutic benefits at doses of >3g/day. This study aimed to investigate the habits, attitudes and perceived benefits of fish oil supplement use in individuals with rheumatoid arthritis.

Methods – A cross-sectional survey using an online self-administered questionnaire designed to assess the habits, attitudes and perceptions of individuals with rheumatoid arthritis regarding the use of fish oil supplements. Participants were recruited using convenience sampling via online social media groups. Descriptive statistical tests were conducted using Microsoft Excel (2016). Inferential statistical tests were conducted using Microsoft Excel and ‘Statistical Package for the Social Sciences’ (SPSS; v24.0, Chicago, III, 2016).

Results – 49 respondents completed questionnaires. Participants were predominantly female (86%) compared to males (14%). The majority of respondents (71%) indicated they took fish oil supplements as opposed (29%) that did not take supplements. More females than males reported taking fish oil supplements, but this was not statistically significant (Chi-squared, \(p=>0.009\), \(t=<0.001\), \(df=1\)). The mean number of fish oil supplement servings per day for women (2.43 ± 1.85 SD) was slightly higher than for men ( 2.00 ±1.20 SD), this was not statistically significant (Mann-Whitney, \(p=0.567\)). The most popular reason for taking fish oil supplements reported by respondents was to help with pain and inflammation (n = 22). Fish oil supplement users had higher mean attitude scores and more positive attitudes than non-users (Mann-Whitney, \(p=<0.001\)). Respondents highlighted the internet, websites and forums as their primary source of information. 37% felt unsure as to whether there was enough trusted information. Overall 67% of respondents felt fish oil supplements had a beneficial effect on their condition.

Conclusions – This study found high prevalence of fish oil supplement use amongst individuals with rheumatoid arthritis. Many perceive taking supplements to benefit their condition. Healthcare professionals should be aware of the prevalence of supplement use and ensure up to date knowledge of the potential benefits and risk so they can be best place to provided patients with trusted information so they can make informed decisions on supplements.
Keywords: Rheumatoid arthritis, Fish oils, Supplements, Complementary and alternative medicine
Introduction

Rheumatoid arthritis (RA) is a chronic auto-immune disease characterised by chronic inflammation and gradual destruction of the joints. It causes severe pain, functional impairment and leads to progressive disability. RA is the most common systemic auto-immune disease and affects approximately 1% of the adult population globally. The prevalence of RA increases with age and female gender (Kvien, 2004). Currently, there is no cure for RA but significant improvements in the treatment and management of the condition have been made in the past two decades, contributing to substantial improvements in patient outcomes (Van Vollenhoven, 2009). This has been achieved by the introduction of potent disease modifying anti-rheumatic drugs and the recognition of the importance of early diagnosis and treatment.

Increased knowledge and understanding of the pathogenesis of RA and the development new targeted drug therapies has enabled some patients to achieve low disease activity or even remission. However, for many patients these treatments are not totally effective and they continue to experience persistent disease activity and lifelong acute exacerbations (Bykerk et al., 2014). In addition, the powerful biological drugs used to treat RA such as methotrexate can have serious side effects leading to systemic complications. Furthermore, the long term use of non-steroidal anti-inflammatory drugs has been associated with increased cardiovascular risk and gastrointestinal bleeding (Langford, 2006).

On this background, many RA patients search for complementary and alternative medicines (CAMs) alongside conventional treatments. The Word Health Organisation defines CAMs as ‘a broad set of healthcare practices that are not part of the countries own tradition and are not integrated into the dominant healthcare system’. Substantial levels of CAM use by patients with RA have been reported within the scientific literature. Previous reports concerning CAM use which have emerged from numerous countries and ethnic groups have estimated between 60% - 90% of patients with RA have tried some form of CAM (Struthers and Scott, 1983, Rao et al., 1999, Breuer et al., 2006). A diverse variety of treatments including acupuncture, massage and ayurveda fall under the umbrella term CAM, but this study focuses on dietary supplements and specifically fish oils. Currently, dietary interventions and over-
the-counter supplements including, vitamins, fish oil, and others, comprise a substantial percentage of CAM usage and it is estimated that over £450 million is spent each year by individuals on different types of CAMs (Bhangle and Kolasinski, 2011). In particular, dietary supplement use has been identified as both an important opportunity and challenge in the care of those with arthritis (Yang et al., 2017).

Many different supplements have been postulated to have a beneficial effect on RA but all but one lacks the scientific evidence to support these claims. The exception is fish oil supplements containing the omega-3 polyunsaturated fatty acids (n-3 PUFAS) eicosapentaenoic acid (EPA) and docosahexaenoic (DHA). Data first emerged regarding the possible anti-inflammatory effects of n-3 PUFAs from epidemiological studies of Greenland Eskimos (Kromann and Green, 1980). Since then n-3 PUFAs have been studied extensively in the scientific literature and the mechanism underpinning their anti-inflammatory properties is now well understood. Many studies have shown that EPA and DHA inhibit some inflammatory processes and as a result may have a role in the treatment of inflammatory conditions such as RA (Miles and Calder, 2012).

A significant amount of evidence exists from multiple clinical trials, a number of meta-analysis and two systematic reviews which supports the use of fish oil supplements in RA. A meta-analysis conducted by Fortin et al. (1995) reported a modest effect of fish oil supplements on morning stiffness and joint tenderness after a period of three months. A second meta-analysis also came to this conclusion reporting that n-3 PUFAs supplementation improves pain outcomes in patients with rheumatoid arthritis (Goldberg and Katz, 2007). Not all studies have come to the same conclusion, MacLean et al. (2004) did not detect any clinically significant effect of fish oil supplementation on pain outcomes. However, methodological issues may account for this discrepancy. A recent systematic review conducted by Abdulrazaq et al. (2017) arrived at the overall conclusions that n-3 PUFAS do reduce joint pain and swelling, morning stiffness and the need for some anti-inflammatory medications. Importantly, these studies have demonstrated a dose dependent relationship indicating that a minimum intake of 3g/day n-3 PUFAs is required to elicit the anti-inflammatory effects and that the symptomatic benefit can be delayed by up to 3 months (Cleland et al., 2003). It is not known whether individuals who take fish oil supplements are
able to achieve the intakes or the durations used in RCTs and therefore it is unclear whether patients perceive any symptomatic improvement.

The high prevalence of CAM use in individuals with RA has been attributed to several factors including, attitudes towards conventional treatment and perceptions that natural supplements can be safer than some medications (Alaaeddine et al., 2012). However, unfortunately the current literature fails to indicate whether individuals use of supplements can be related specifically to arthritis. This may be in part due to the lack of studies that have exclusively focused on dietary supplements and excluded other types of CAM. Nevertheless, there is an urgent need to document to use the of dietary supplements and understand what motivates individuals with RA to use them.

Furthermore, previous research has highlighted that there is a lack of communication between patients and healthcare professionals (HCPs) regarding the use of dietary supplements. Some patients feel discussing their use of CAMs is not appropriate and others have reported HCPs hold unsupportive attitudes and lack knowledge (Cheung, 2012). One study reported that 71% of patients had not discussed their use of non-prescription treatments with their physician (Alvarez-Nemegyei et al., 2009). This apparent lack of patient-practitioner communication serves to confound the importance of understanding the current habits and perceptions of individuals regarding supplement use.

Based upon the empirical evidence examined in the literature review prior to this study, it is evident that fish oil use by rheumatic patients is a pertinent research issue. This coupled with the fact that there is a distinct lack a research into the prevalence of dietary supplement use has prompted this current study to address the gaps highlighted in the literature buy exclusively investigating the use of fish oils. The aim of this cross-sectional survey is to investigate the habits, attitudes and perceived benefits of fish oil supplement use in individuals with rheumatoid arthritis.
Methods

A cross-sectional study design was used to investigate the habits, attitudes and perceptions of individuals with rheumatoid arthritis regarding the use of fish oil supplements using a self-administered online questionnaire designed to capture quantitative data. This allows for the investigation of the views of a target population and their characteristics at a specific point in time (Denscombe, 2014). Cross-sectional studies are especially useful for estimating the prevalence of a particular behaviour in a population and can be used to generate hypotheses for future research (Levin, 2006). They can be simple, inexpensive and relatively quick to conduct (Sedgwick, 2014). However, cross-sectional studies have their limitations as data is collected at one point in time and therefore cannot be used to infer causation (Ruane, 2005). In addition, cross-sectional research may be prone to non-response bias if those who consent to participate differ from those that do not, resulting in a sample that is not representative of the population being studied (Sedgwick, 2014). An alternative method would be to collect qualitative data through a focus group or structuring the questionnaire to include open questions. This would result in more comprehensive answers providing detailed responses as participants are invited to express their views on the topic openly. However, this method is not commonly used in this type of research due to the time consuming nature of qualitative research, smaller sample sizes and difficult in analyzing and interpreting the data collected (Bell, 2014).

Participants

A convenience sample of adults (≥ 18 years) with a self-reported diagnosis of rheumatoid arthritis were recruited to participate in this study. Participants were recruited from via the social media platform Facebook. This involved targeting rheumatoid arthritis support groups between August and September 2017. It was decided that random sampling was not possible due to the practicalities and resources available. Unavoidably, the sampling method used in this study imposes some major methodological limitations. Due to the nature of this method it is certain that the sample population is not representative of the entire population of individuals with RA and therefore external validity is reduced. In addition, it is likely that the data gathered in this study is skewed by response bias. Participants who took part in the study are likely to have different levels of motivation and interested in the research topic than
those that did not participate. Therefore, participants may hold different levels of knowledge attitudes, and perceptions that make them more likely to use fish oil supplements.

**Ethical Considerations**

This study was approved by the Cardiff School of Health Sciences ethics panel of Cardiff Metropolitan University prior to data collection. It is acknowledged that there are inherent difficulties in maintaining ethical standards when conducting research online as mentioned be Leedy and Ormrod (2005).

**Materials**

A 26 item online questionnaire was developed using Qualtrics online survey software. The questionnaire was influenced by a number of reliable and validated questionnaires used in studies investigating attitudes regarding the use of complementary and alternative medicines. These include the Health Belief Questionnaire (CHBQ) (Lie and Boker, 2004), the Integrative Medicine Attitude Questionnaire (IMAQ) (Schneider et al., 2003) and the Alternative and Integrative Medicine Attitudes Questionnaire (Abbott et al., 2011). However, as this current study aimed to gather specific data on the use of fish oil supplements in individuals with RA it was decided that a new questionnaire should be constructed designed to elicit only data relevant to this study.

The questionnaire consisted of 26 multiple choice questions sub divided into four categories. Demographic information was obtained to enable the comparison of the characteristics of supplement users and non-supplement users. Questions relating to the subjective severity of individual’s condition, duration of disease, use of medication and perceived effectiveness of their treatment was obtained to analyse weather disease severity, effectiveness of medication or duration of disease had any influence on supplement use. There were four statements designed to capture data relating to the attitudes regarding diet, physical health and supplement use. Participants were asked to what extend they agreed or disagreed with each statement. These questions were included to see weather individual’s attitudes were predictive of supplement use. Questions relating specifically to the use of fish oil supplements were included to capture data on the habits, perceived benefits and reasons for using supplements, a question relating to reasons for not using supplements was also included.
There are a number of advantages of using an online questionnaire to collect data. Online web based questionnaires can take advantages of all the usual website features that people find attractive including icons and buttons. They can also be made to look attractive with graphics and colours incorporated into the design. In addition, answers can be recorded instantly and incorporated into a database improving the speed and accuracy of data collection (Denscombe, 2014). A further advantage is that an online questionnaire offers greater anonymity which increases the likelihood of obtaining accurate information to more sensitive questions and excludes interviewer bias (Kumar and Phrommathed, 2005).

A pilot study is a valuable means of assessing the structure, comprehension and interpretation of survey content before distribution (Polgar and Thomas, 2011). Therefore, an informal pilot of the questionnaire was carried out on n=1 participant with RA, feedback was obtained to highlight any refinement needed in terms of content, wording and ease of use; based on this, no changes were made to the questionnaire. The data from this pilot study was included in the results.

**Procedure**

A convenience sample of individuals with RA were identified, individuals were then contacted either by face to face, emails, text of phone and asked if they would be willing to participate in the study. Willing participants were sent a participant information sheet (APPENDIX) describing the study aims, participant expectations and informing participants that consent to take part was implied through completion of the questionnaire. Participants were free to withdraw from the study at any time prior to completing the questionnaire as they were anonymous. Participants were then sent a hyperlink via email, text or on social media messaging services that linked to the online questionnaire (Qualitrics Survey software) hosted on a Cardiff Metropolitan University (CMU) server. The self-administered online questionnaire took between five and ten minutes to complete. Responses to the questionnaire were automatically recorded on completion, participants were thanked for taking part in the study.
Data Analysis

Descriptive statistical tests were conducted using Microsoft Excel (2016). Inferential statistical tests were conducted using Microsoft Excel and ‘Statistical Package for the Social Sciences’ (SPSS; v24.0, Chicago, Ill, 2016). Statistical significance was defined as p<0.05. Questions that included tick all that apply were tallied as statistical analysis was not possible. See appendix 2 for raw excel and SPSS data. A scoring system was devised to assess respondent’s attitudes towards four statements relating to diet, supplements and rheumatoid arthritis. The scale scored respondents answers from 1 to 5 (1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, 5=strongly agree). Scores 1 and 2 were deemed to be negative, 3 was deemed to be neutral, 4 and 5 were deemed to be positive. The total score from each question was then calculated and used to categorise respondents into three groups. Respondents with scores ranging from 4 to 11 indicated negative attitudes, scores of 12 indicated neutral attitudes and score between 13-20 indicated positive attitudes.
Results

A total of 59 questionnaires were completed, of these 9 were excluded due to partial completion and 1 was excluded due to the respondent being under 18. Consequently, a total of 49 responses were included in the present analysis.

Table 1. Sample demographic characteristics

<table>
<thead>
<tr>
<th></th>
<th>Respondents n</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>42</td>
<td>(86%)</td>
</tr>
<tr>
<td>Male</td>
<td>7</td>
<td>(14%)</td>
</tr>
<tr>
<td><strong>Age (years):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 18</td>
<td>0</td>
<td>(0)</td>
</tr>
<tr>
<td>18 – 24</td>
<td>3</td>
<td>(6)</td>
</tr>
<tr>
<td>25 – 34</td>
<td>9</td>
<td>(18)</td>
</tr>
<tr>
<td>35 – 44</td>
<td>12</td>
<td>(24)</td>
</tr>
<tr>
<td>45 – 54</td>
<td>11</td>
<td>(24)</td>
</tr>
<tr>
<td>55 – 64</td>
<td>9</td>
<td>(18)</td>
</tr>
<tr>
<td>65 – 74</td>
<td>4</td>
<td>(8)</td>
</tr>
<tr>
<td>75 – 85</td>
<td>1</td>
<td>(2)</td>
</tr>
<tr>
<td>85 &gt;</td>
<td>0</td>
<td>(0)</td>
</tr>
<tr>
<td><strong>Highest level of educational attainment:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>0</td>
<td>(0)</td>
</tr>
<tr>
<td>Secondary school</td>
<td>13</td>
<td>(26)</td>
</tr>
<tr>
<td>College / sixth form</td>
<td>12</td>
<td>(23)</td>
</tr>
<tr>
<td>University / Degree</td>
<td>15</td>
<td>(32)</td>
</tr>
<tr>
<td>Postgraduate</td>
<td>9</td>
<td>(17)</td>
</tr>
</tbody>
</table>

Participants were predominantly female n = 43 (86%) compared to male’s n = 7 (14%). With regard to age the majority of respondent’s n = 12 (24%) identified as been in 35-44 age category with few participants under the age of 25 n = 3 (6%) and over the age 74 n = 2 (2%). The majority of respondents indicated level of education attainment as university or degree n = 15 (32%), then secondary school n = 12 (26%), followed by college or sixth form n = 12 (23%), only n = 9 respondents had postgraduate education. There was no statistical significance between the age females and males (chi squared, p=0.238, t=8.002, df=6).
Disease characteristics of sample population

Table 1. Respondents time since initial diagnosis of RA.

<table>
<thead>
<tr>
<th>Time since diagnosed with rheumatoid arthritis</th>
<th>&lt; 6 months</th>
<th>6 – 12 months</th>
<th>1-2 years</th>
<th>2-4 years</th>
<th>&gt; 5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 5</td>
<td>n = 2</td>
<td>n = 4</td>
<td>n = 12</td>
<td>n = 26</td>
<td></td>
</tr>
<tr>
<td>(10%)</td>
<td>(4%)</td>
<td>(8%)</td>
<td>(24%)</td>
<td>(53%)</td>
<td></td>
</tr>
</tbody>
</table>

Respondents tended to have longer disease duration with n = 26 (53%) having been diagnosed for > 5 years. Fewer respondents’ n = 12 (24%) had shorter duration disease duration between 2-4 years.

Table 2. Disease severity score in the past 12 months (Likert Scale 0-10).

<table>
<thead>
<tr>
<th>Gender</th>
<th>Range</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>7</td>
<td>3.17</td>
<td>±2.05</td>
<td>n = 7</td>
</tr>
<tr>
<td>Female</td>
<td>10</td>
<td>6.85</td>
<td>±2.06</td>
<td>n = 42</td>
</tr>
</tbody>
</table>

0 = lowest severity, 10 = highest severity

Female respondents reported higher mean disease severity scores (6.85) compared to males who’s mean disease severity score was (3.17). There was statistical significance between mean disease scores for each gender (Mann-Whitney, p=0.001).

Table 3. Disease effect on quality of life

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Mildly</th>
<th>Moderately</th>
<th>Severely</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 2</td>
<td>n = 9</td>
<td>n = 20</td>
<td>n = 18</td>
</tr>
<tr>
<td>(4%)</td>
<td>(18%)</td>
<td>(41%)</td>
<td>(37%)</td>
</tr>
</tbody>
</table>

The majority of respondents indicated that their disease had moderately n = 20 (41%) to severely n = 18 (37%) affected their quality of life.
Table 4. Participants habits regarding taking fish oil supplements

<table>
<thead>
<tr>
<th>Gender</th>
<th>Currently take a fish oil supplement</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (n)</td>
<td></td>
<td>n = 5</td>
<td>n = 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(14%)</td>
<td>(14%)</td>
</tr>
<tr>
<td>Female (n)</td>
<td></td>
<td>30</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(86%)</td>
<td>(86%)</td>
</tr>
<tr>
<td>Total (n)</td>
<td></td>
<td>n = 35</td>
<td>n = 14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(71%)</td>
<td>(29%)</td>
</tr>
</tbody>
</table>

Table 1. The majority of respondents’ n = 35 (71%) indicated they took fish oil supplements as opposed to n = 14 (29%) that indicated they did not take supplements. More females’ n = 30 than males’ n = 5 reported taking fish oil supplements, however this was not statistically significant (Chi-squared, p=>0.009, t=<0.001, df=1).

Table 5. Type of fish oil supplement

<table>
<thead>
<tr>
<th>Type of fish oil supplement taken</th>
<th>Capsule</th>
<th>Liquid</th>
</tr>
</thead>
<tbody>
<tr>
<td>n =34 (97%)</td>
<td>n = 1</td>
<td>(3%)</td>
</tr>
</tbody>
</table>

Fish oil capsules were the most popular form of supplements with n = 34 (97%) respondents taking this form of supplement, whereas only (n = 1) respondent indicated they consumed fish oil liquid.

Table 6. Number of fish oil servings per day

<table>
<thead>
<tr>
<th>Gender</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Median</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>1.00</td>
<td>4.00</td>
<td>2</td>
<td>2.00 ±1.20</td>
</tr>
<tr>
<td>Female</td>
<td>1.00</td>
<td>5.00</td>
<td>2</td>
<td>2.43 ±1.85</td>
</tr>
</tbody>
</table>

The mean number of fish oil supplement servings per day for women (2.43 ±1.85 SD) was slightly higher than for men ( 2.00 ±1.20 SD), however this was not statistically significant (Mann-Whitney, p=0.567).
Fish oil supplement use tended to be over a longer period of time with the highest proportion of supplement users’ n = 19 (54%) indicating regular fish oil supplement use for more than 1 year. A combined total of n = 16 (45%) had regularly used fish oil supplements for less than 1 year, of these n = 4 (11%) indicating supplement use for less than 3 months.

Overall respondents that took fish oil supplements tended to believe that they had a beneficial effect on their condition with n = 22 (61%) reporting a probably effect and n = 9 (25%) reporting they felt supplements had a definite effect. Only a combined total of n = 5 (14%) respondents indicating fish oil supplements either having no probable or definite effect.
The most popular reason for taking fish oil supplements reported by respondents was to help with pain and inflammation (n = 22). Fewer (n = 20) cited for general health and well-being, followed by (n = 17) indicating to keep joints and bones supple as a reason. Considerably less respondents’ (n = 6) identified promoting a healthy heart. Reducing medication and supplements having less side effects than medication was selected by (n = 4) and (n = 3) respondents respectively. (N = 0) participants indicated boosting immune system as a reason for their supplement use.
Attitudes towards diet, supplements and rheumatoid arthritis.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither Disagree or Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A good diet is essential for maintaining health, some feel making</td>
<td>N = 29 (60%)</td>
<td>N = 15 (30%)</td>
<td>N = 5 (10%)</td>
<td>N = 0 (0%)</td>
<td>N = 0 (0%)</td>
</tr>
<tr>
<td>dietary changes may help people with rheumatoid arthritis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Omega 3 polyunsaturated fatty acids (found naturally in oily fish) can</td>
<td>N = 13 (26%)</td>
<td>N = 19 (38%)</td>
<td>N = 15 (30%)</td>
<td>N = 2 (4%)</td>
<td>N = 0 (0%)</td>
</tr>
<tr>
<td>be helpful if you have inflammatory arthritis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>As well as having a healthy, balanced diet getting additional nutrients</td>
<td>N = 19 (38%)</td>
<td>N = 20 (40%)</td>
<td>N = 10 (20%)</td>
<td>N = 0 (0%)</td>
<td>N = 0 (0%)</td>
</tr>
<tr>
<td>from food supplements may help if you have arthritis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dietary supplements are more natural and have less side effects than</td>
<td>N = 21 (42%)</td>
<td>N = 15 (30%)</td>
<td>N = 11 (22%)</td>
<td>N = 2 (4%)</td>
<td>N = 0 (0%)</td>
</tr>
<tr>
<td>traditional medication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Scoring: 1 strongly disagree, 2 disagree, 3 neither disagree or agree, 4 agree, 5 strongly agree

**Figure. Differences between fish oil supplement users and non-user’s attitudes**

<table>
<thead>
<tr>
<th>Currently takes or has considered taking a fish oil supplement</th>
<th>Negative (4-11)</th>
<th>Neutral (12)</th>
<th>Positive (13-20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>N = 0 (0%)</td>
<td>N = 3</td>
<td>N = 34</td>
</tr>
<tr>
<td>No</td>
<td>N = 0</td>
<td>N = 1</td>
<td>N = 11</td>
</tr>
</tbody>
</table>

Out of fish oil supplement users and non-users, supplement users had higher mean attitude scores than those that did use fish oil supplements and thus more positive attitudes towards the influence diet, omega-3 PUFAS and supplements have with regard to rheumatoid arthritis. This result was statistically significant (*Mann-Whitney, p=<0.001*). Shapiro-Wilk analysis for normality indicated the attitude scores were not normally distributed (*p=0.002, t=0.915, df=49*).
Respondents predominantly (n = 23) highlighted the internet, websites and forums as their primary source of information regarding supplements. Secondary sources of information included family, friends and doctor’s nurses of pharmacists (n= 11) respectively. Books and magazines were also a source of information. Nutritionists or Dietitians were the least popular source of information. Two other categories were peer reviewed journals and Juice plus.

Table 3. Do you feel there is enough trusted information regarding fish oil supplements

<table>
<thead>
<tr>
<th></th>
<th>Definitely yes</th>
<th>Probably yes</th>
<th>Unsure</th>
<th>Probably not</th>
<th>Definitely Not</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 2</td>
<td>N = 9</td>
<td>N = 13</td>
<td>N = 9</td>
<td>N = 2</td>
<td></td>
</tr>
<tr>
<td>(6%)</td>
<td>(26%)</td>
<td>(37%)</td>
<td>(26%)</td>
<td>(6%)</td>
<td></td>
</tr>
</tbody>
</table>

Respondents (37%) were largely unsure whether there was enough trusted information on the use of fish oil supplements. Equally numbers of respondents’ n = 9 (26%) indicated that they felt there probably was enough and probably wasn’t enough trusted information.
Discussion

This cross-sectional survey aimed to investigate the habits, attitudes and perceived benefits of fish oil supplement use in individuals with rheumatoid arthritis.

Limitations

It is important to acknowledge that this study is constrained by a number of methodological limitations that may affect the generalisability of the findings. The non-random sample of participants recruited for this study are likely to pose different characteristics from the general population of RA patients. Additionally, participants were recruited from social media groups that promoted the use of diet and supplements as a means of treatment for RA and may therefore pose different attitudes to individuals that do not participate in similar groups. Furthermore, the small sample size obtained further reduces the representativeness of the study population preventing concrete inferences from being drawn. The validity of the questionnaire must also be considered as it was not formally validated prior to data collection.

Supplement use

This present study found a high prevalence of fish oil supplement use with 71% of respondents reporting taking fish oil supplements. This is higher than that reported by Ikuyama et al. (2009) who conducted a similar survey of dietary supplement use in individuals with rheumatoid arthritis in Japan. Supplement use was higher in females (86%) than in males (14%) although this was not statistical significant. There were no associations detected between age, educational attainment and supplement use, in contrast to previous studies that have reported users are more likely to be female, younger and be highly educated and affluent (Ikuyama et al., 2009, Kajiyama et al., 2006). However, not all recent studies have demonstrated this association and predictors of the use of dietary supplements and other CAMs in rheumatic diseases has been varied (Kolasinski, 2012, Singh and Levine, 2006, Ramos-Remus et al., 1999). The disparity apparent in these findings may have arisen from the diverse characteristics of the populations being studied and methodological differences in study design. The results from this study do however fit within the border context of the literature which suggests the use of CAMs by individuals with arthritis is higher than that of the general population (Soeken et al., 2003). In particular, studies investigating the use of
different types of CAM have found that nutritional supplements are often the most popular type of CAM (Efthimiou et al., 2010, Buchbinder et al., 2002). These results highlight that patents with RA frequently use fish oil supplements but that more studies are needed to clarify the predictors of their use.

The average number of fish oil servings per day was $2.43 \pm 1.85$ for females and $2.00 \pm 1.20$ for males, with the median number of servings being 2. Supplement users predominantly reported using fish oil capsules (98%) as opposed to fish oil liquid (3%). The average fish oil capsule provides 1000mg fish oil, containing 180mg of EPA and 120mg DHA, although doses can vary significantly (National Institutes of Health, 2015). The evidence from multiple meta-analysis and systematic reviews identifies a threshold of $>3g$/day of EPA and DHA to elicit the therapeutic analgesic effects of omega-3 fatty acids (Abdulrazaq et al., 2017, Goldberg and Katz, 2007, Fortin et al., 1995). However, supplement users in this study had on average intakes of 540mg EPA and 360mg DHA, at these levels their intakes fall considerably short of the lower threshold that has shown efficacy in RCTs. This is particularly concerning as 77% of respondents reported spending over £10 a month on supplements that may not have any beneficial effect on their RA. Interestingly, despite the bulk of the scientific evidence suggesting a minimum dose, this study indicated high levels of satisfaction. Concurrently, 86% of respondents reported that taking fish oil supplements had a beneficial effect on their condition. The misalignment of the scientific evidence and perceptions of the respondents in this study raises the question as to whether supplement users are experiencing placebo effects or are fish oils really working. Irrespective, these findings stimulate curiosity into what influences individuals to use supplements.

**Motivation, information sources and perceived benefits of supplement use**

The three most popular reasons identified in this study for taking fish oil supplements in order were; to help with pain and inflammation, for general health and well-being and to keep joints and bones supple. These findings are similar to a plethora of related studies that have consistently reported pain as a principle reason for CAM use in patients with RA (Yang et al., 2017). Some studies have attributed the high prevalence of supplement use to external factors such as pressure from commercial marketing strategies that have advocated the use of fish oils in treating joint and bone problems. Others have suggested individuals who use
supplements may value natural and holistic approaches to health or want to participate in treatment decisions (Efthimiou et al., 2010, Bishop et al., 2007). To further complicate the matter, it may not even be possible to attribute the use of supplements to an individual’s disease or diagnosis, as many respondents in this study also suggested they used fish oil supplements for general health and well-being and therefore their use may not necessarily be entirely related to their diagnosis of RA. This study verifies that users of non-conventional medicines and therapies do so for a wide variety of reasons and untangling the underlying factors that influence their decision is a complicated process. Nonetheless improving understanding surrounding the expectations of patients who use CAMs might be valuable in numerous ways.

A key purpose of this study was to explore the various information sources RA patients use to inform their use of fish oil supplements and if they can be trusted. It was not surprising that many respondents reported relying on the internet, website and forums as their primary source of information. The National Rheumatoid Arthritis Society and PatientsLikeMe are just two of the vast number of online forums with substantial members. Self-help groups on social media are particularly popular with highly active followers. While these easily accessible domains provide many with a place a share their experience and find support from other RA suffers, their deregulated nature is particularly concerning. Often individuals advocate all kinds of miracle cures and obscure treatments with no scientific evidence base to support their use. Respondents also cited family and friends as a source of information along with doctors, nurses of pharmacists. Previously, Marsh et al. (2009) reported 49% of arthritic patients surveyed cited family and friends as their primary source of information on non-conventional forms of treatment. Likewise, Ünsal and Gözüm (2010) identified family members and relatives as the most popular information source in their survey. The findings reported here clearly underline the need for patients to be able to access reliable sources of information to ensure they receive accurate and safe information on dietary supplements.

Many supplement users reported getting advice and recommendations from their healthcare professional (HCP). A similar trend was also identified in a previous cross-sectional survey investigating the use of natural health products by rheumatic patients, which found that 40% of patients sought advice from their physician (Hall et al., 2017). Conversely, many other
studies have reported that HCPs have unsupportive attitudes and lack specific knowledge of CAMs (Lee et al., 2008, Bhalerao et al., 2013, Alaaeddine et al., 2012, Sleath et al., 2008). The proportion of fish oil supplement users in this sample that had informed their health professional of supplement use (65%) was far higher than previously reported in a number of studies (Arcury et al., 2007, Bruno and Ellis, 2005, Hall et al., 2017). Despite the low prevalence (6%) of unwanted side effects reported in this investigation, patient safety still remains a factor. Fish oils have been shown to effect coagulation and can be of concern to patients on anti-coagulant medication (Buckley et al., 2004). As a result, patients of warfarin have been advised to avoid high dose PUFAS and monition their internatiolanised normalized ration (INR) (Zhao et al., 2017). Taken together, the findings form this study may indicate that the patients from this sample are more willing and open to discussing their use of alternative treatments and certain HCPs may be more accepting of non-conventional medicine. Regardless of the possible inference drawn from these data it is reassuring that some patients are seeking medical opinions to make informed decision on supplement use especially considering the possibility of adverse effects.

Conclusions and future research
To conclude, despite the acknowledged limitations, this study study confirms the high prevalence of dietary supplement use by individuals with RA. Supplement users had on average intakes of 540mg EPA and 360mg DHA, these intakes are substantially less than >3g/day, minimum dose required to elicit therapeutic effects (Abdulrazaq et al., 2017). Despite this many perceived that using supplements had a beneficial effect and satisfaction levels were high. A lack of trusted information was highlighted as a major concern and few had discussed supplements with their healthcare professional. Healthcare professionals should be aware of the prevalence of supplement use and ensure up to date knowledge of the potential benefits and risk so they can be best place to provided patients with trusted information so they can make informed decisions on supplements. Future research using large randomly selected samples should be conducted to asses weather these results can be extrapolated.

Word Count: 5222
References


Bhalerao, M., Bolshete, P., Swar, B., Bangera, T., Kolhe, V., Tambe, M., Wade, M., Bhowate, S., Sonje, U. and Gogtay, N. (2013) 'Use of and satisfaction with complementary and alternative medicine in four chronic diseases: a cross-sectional study from India'.


Appendix 1.
Ethics Committee
Participant Information Sheet

I am asking you to take part in a brief 5 – 10 minute survey to help with my dissertation. I am interested in understanding the attitudes individuals with rheumatoid arthritis have regarding diet and the use of supplements. I would be extremely grateful for your participation.

This project was stimulated by previous research investigating the effect of fish oil supplementation on individuals with rheumatoid arthritis. We want to investigate the habits, attitudes and knowledge people with rheumatoid arthritis possess regarding diet and the use of supplements. We want to find this out in order to help further understand the role supplements have in the lives of people with rheumatoid arthritis.

- The study is being organised by Aneurin Campbell a final year BSc (Hons) Human Nutrition and Dietetics student at Cardiff Metropolitan University

- If you want to find out more about the project, or if you need more information please contact the study supervisor Aneurin Campbell via email at st20082489@cardiffmet.outlook.ac.uk

Your Participation in the survey

Why you have been asked
I am asking adults with rheumatoid arthritis living in the UK to take part in the study.

What happens if you want to change your mind?
If you decide to start the survey you can change your mind and stop part way through the completing the questionnaire. You will not be asked why you’ve stopped. We will completely respect your decision. If you choose to complete the questionnaire in full, you are consenting to take part in the survey.

What would happen if you join the study?
If you agree to join the survey, then I would ask you to complete a questionnaire about your attitudes and possible use of supplements. A link to this questionnaire will be provided, and I think this would take you only 5 -10 minutes to complete.

Are there any risks?
There are not any risks if you take part in the study.

Any special precautions needed?
None

What happens to the questionnaire results?
The researcher is responsible for putting all the information from the study into a computer programme. I will then use this information to build a picture of the general habits and beliefs individuals with rheumatoid arthritis have regarding the effects of diet and supplementation on their rheumatoid arthritis.

Are there any benefits from taking part?
There are no direct benefits to you for taking part.

How we protect your privacy:
All the information we get from you is anonymous, and everyone working on the study will respect your privacy. All questionnaires are anonymous and we will not require your name or any personal details from you. There is no information on the questionnaire that could let anyone work out who you were. At the end of the study we will destroy the information we have gathered.
Dear Applicant

Re: Application for Ethical Approval: A description of the intake, attitudes and knowledge people with rheumatoid arthritis have regarding fish oil supplementation.

Project Reference Number: 9288

Your ethics application, as shown above, was considered by the Health Care and Food Ethics Panel on 26/07/2017.

I am pleased to inform you that your application for ethical approval was APPROVED.

Minor issues may still need addressing before you commence any work – if so these will be listed below.

N/A

Where changes to the information sheet, consent form and/or procedures are deemed necessary you must submit revised versions to the relevant ethics inbox. If you are a student – your supervisor must do this on your behalf.

Note: Failure to comply with any issues listed above will nullify this approval.

Standard Conditions of Approval

1. Your Ethics Application has been given a Project Reference number as above. This MUST be quoted on all documentation relating to the project (e.g. consent forms, information sheets), together with the full project title.

2. All documents must also have the approved University Logo and the Version number in addition to the reference and project title as above

3. A full Risk Assessment must be undertaken for this proposal, as appropriate, and be made available to the Committee if requested.

4. Any changes in connection to the proposal as approved, must be referred to the Panel/Committee for consideration without delay quoting your Project Reference Number. Changes to the proposed project may have ethical implications so must be approved.

5. Any untoward incident which occurs in connection with this proposal must be reported back to the Panel without delay.

6. If your project involves the use of human samples, your approval is given on the condition that you or your supervisor notify the HTA Designated Individual of your intention to work with such material by completing the form entitled “Notification of Intention to Work with Human Samples”. The form must be submitted to the PD (Sean Duggan), BEFORE any activity on this project is undertaken.
The habits and perceived benefits of fish oil supplements in individuals with rheumatoid arthritis

Start of Block: Demographics

Q1 Thank you for your participation. This survey will take between 5-10 minutes. All responses are anonymous. Your time is greatly appreciated!

Q1. Please select your gender.

- Male
- Female

Q2 What is your highest level of educational attainment?

- Primary School
- Secondary school
- Sixth form / College
- University / Degree
- Postgraduate
Q3. How old are you? (please select appropriate box)

- Under 18
- 18 - 24
- 25 - 34
- 25 - 34
- 35 - 44
- 45 - 54
- 55 - 64
- 65 - 74
- 75 - 84
- 85 or older

End of Block: Demographics

Start of Block: Yes

Q5. For how long have you been diagnosed with rheumatoid arthritis? (please select appropriate box)

- Six months or less
- 6 months - 1 year
- 1 - 2 years
- 2-4 years
- 5 years +
Q7 Q6. Do you feel rheumatoid arthritis has affected your quality of life? <span style="font-size: 11px;">(please select appropriate box)</span>

- Not at all
- Mildly
- Moderately
- Severely

Q8 Q7. In the past 12 months, on a scale of 1 to 10 how severe would you rate your symptoms? <div><span style="font-size: 11px;">(0 not at all severe and 10 is extremely severe)</span></div>

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 not severe</td>
<td>10 severe</td>
<td></td>
<td></td>
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</tbody>
</table>

Q6 Q8. Are you currently taking any prescribed medications for your rheumatoid arthritis? <div><span style="font-size: 11px;">(please select appropriate box)</span></div>

- Yes
- No
Q9. How effective do you feel the medication for your rheumatoid arthritis is at alleviating the symptoms? (please select appropriate box)

- Extremely effective
- Very effective
- Moderately effective
- Slightly effective
- Not effective at all

End of Block: Yes

Start of Block: Block 4

Q49. Please read the following statements and select which phrase best describes your attitude.

Q10. A good diet is essential for maintaining health, some feel making dietary changes may help people with rheumatoid arthritis (please select appropriate box)
Q47 Q11. Omega 3 polyunsaturated fatty acids (found naturally in oily fish) can be helpful if you have inflammatory arthritis (please select appropriate box):

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

Q50 Q12. As well as having a healthy, balanced diet getting additional nutrients from food supplements may help if you have arthritis (please select appropriate box):

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree
Q51 Q13. Dietary supplements are more natural and have less side effects than traditional medication.

(please select appropriate box)

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

End of Block: Block 4

Start of Block: Yes

Q48 Q14. Do you currently take or have you ever considered taking a supplement containing fish oil?

If answering No to this question please proceed to Q27.

- Yes
- No

Q44 Q15. Do you feel taking a fish oil supplement has a positive effect on your symptoms?

(please select appropriate box)
Q18 Q16. From the following options please select the 2 main reason you take fish oil supplements?<div style="font-size: 11px;">(please select appropriate boxes)</div>

- [ ] To help with pain and inflammation
- [ ] For general health and well-being
- [ ] To keep joints and bones supple
- [ ] Less side effects than medication
- [ ] To boost immune system
- [ ] To promote a healthy heart
- [ ] To reduce medication
- [ ] Other, please specify ________________________________

Q12 Q17. What type of fish oil supplement do you take? <span style="font-size: 11px;">(please select appropriate box)</span>

- [ ] Capsule
- [ ] Liquid
Q13 Q18. How many capsules or liquid servings of fish oil do you take per day? *(please select appropriate box)*

- 1
- 2
- 3
- 4
- 5+

Q14 Q19. For how long have you been regularly taking fish oil supplements? *(please select appropriate box)*

- less than 3 months
- 3 - 6 months
- 6 months - 1 year
- More than 1 year

Q15 Q20. Have you ever had any unwanted side effects that you feel have been caused by taking fish oil supplements? *(please select appropriate box)*

- Yes
- No
Q16. Where do you look for information regarding fish oil supplement use? (you may select multiple boxes)

☐ Family/Friends

☐ Complimentary and alternative therapy practitioner

☐ Books

☐ Magazines/Newspapers

☐ Doctor, Nurse or Pharmacist

☐ Internet/websites/forums

☐ Nutritionist or Dietitian

☐ Other please state ________________________________

Q17. Do you feel there is enough trusted information regarding the use of fish oil supplements for people with rheumatoid arthritis? (please select appropriate box)

☐ Definitely yes

☐ Probably yes

☐ Unsure

☐ Probably not

☐ Definitely not
Q19 Q23. Which term best describes how you feel with regard to the effect supplements have on your condition? *(please select appropriate box)*

- Satisfied
- Dissatisfied
- Uncertain

---

Q20 Q24. Roughly how much do you spend on fish oil supplements each month? *(please select appropriate box)*

- Less the £10
- £10 - £15
- £20 - £25
- £25 or more
Q11 Q25. Do you take any other of the following dietary or herbal supplements? <span style="font-size: 11px;">(you may select multiple boxes) </span> 

☐ Vitamin D  
☐ Calcium  
☐ Glucosamine  
☐ Vitamins A,C,E  
☐ Zinc  
☐ Turmeric  
☐ Ginger  
☐ Selenium  
☐ Vitamin B complex  
☐ Folic acid  
☐ Multivitamin  
☐ Vitamin E  
☐ Probiotic  
☐ Other ________________________________________________
Q21 <div><span style="-webkit-tap-highlight-color: transparent;">Q26. Have you discussed supplement use with any of the medical professionals treating you for arthritis? (please select appropriate box)</span></div>

- Yes
- No

End of Block: Yes

Start of Block: If answered no

Q22 Please only answer this question if answering No to Q14.

Q27. Please describe the reasons for not taking a fish oil supplement

- Supplements are expensive
- A good balanced diet is enough
- They have no benefit
- Have been advised not too
- Unwanted side effects

End of Block: If answered no
Cross-sectional survey on the habits, attitudes and perceived benefits of fish oil supplement use in individuals with rheumatoid arthritis

Campbell-Dowrick, A.L. and Harris R
Centre of Nutrition and Dietetics, Cardiff Metropolitan University, Cardiff, CF5 2YB
Contact Harris, R. rharris@cardiffmt.ac.uk

Background
Rheumatoid arthritis (RA) is a chronic auto-immune disease characterised by chronic inflammation and gradual destruction of the joints. For many patient’s current treatments are not totally effective and they continue to experience persistent disease activity. Previous research indicates many patients use dietary supplements as a complementary and alternative medicine (CAM). Estimates suggest the prevalence of CAM use is between 50-50% (Breuer et al., 2006). Substantial evidence from randomised control trials indicates fish oils elicit therapeutic benefits at doses of >3g/day but it is not known if these doses are achieved using over the counter fish oil supplements. This study aimed to investigate the habits, attitudes and perceived benefits of fish oil supplement use in individuals with rheumatoid arthritis.

Methods
A cross-sectional survey using an online self-administered questionnaire designed to assess the habits, attitudes and perceptions of individuals with rheumatoid arthritis (n= 49) regarding the use of fish oil supplements. Participants were recruited using convenience sampling via online social media groups. Descriptive statistical tests were conducted using Microsoft Excel (2016). Inferential statistical tests were conducted using Microsoft Excel and ‘Statistical Package for the Social Sciences’ (SPSS) v24.0, Chicago, Ill., 2016.

Results
A total of 59 questionnaires were completed for analysis. Participants were predominantly female n= 43 (86%) compared to male’s n= 7 (14%). Respondents tended to have longer disease duration with n= 26 (53%) having been diagnosed for > 5 years. The majority of respondents indicated their disease had moderately n= 20 (41%) to severely n= 18 (37%) affected their quality of life.

Table 1.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Currently take a fish oil supplement</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>n = 20 (41%)</td>
<td>n = 2 (4%)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>n= 35 (71%)</td>
<td>n= 36 (72%)</td>
<td></td>
</tr>
</tbody>
</table>

The majority of respondents’ n = 35 (71%) indicated they took fish oil supplements as opposed to n = 14 (29%) that indicated they did not take supplements. More females’ n = 30 than males’ n = 5 reported taking fish oil supplements, however this was not statistically significant (Chi-squared, p=0.009, t=0.001, df=1).

Table 2. Perceived benefits of fish oil supplements on condition.

| Do you feel taking fish oil supplements has had a beneficial effect on your condition? |
|---------------------------------|-------------------------------|----------------|----------------|
| Definitely not                  | Probably not                  | Probably yes   | Definitely yes |
| n = 1                           | n = 4                         | n = 22         | n = 9          |
| (19%)                          | (11%)                         | (61%)          | (25%)          |

Overall respondents that took fish oil supplements tended to believe that they had a beneficial effect on their condition with n= 22 (61%) reporting a probably effect and n = 9 (25%) reporting they felt supplements had a definite effect. Only a combined total of n = 5 (14%) respondents indicating fish oil supplements either having no probable or definite effect.

Table 3. Attitude scores towards diet, supplements and RA.

<table>
<thead>
<tr>
<th>Currently takes an attitude</th>
<th>Attitude Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>has considered taking a fish oil supplement</td>
<td>Negative (1-11)</td>
</tr>
<tr>
<td>Yes</td>
<td>N = 0</td>
</tr>
<tr>
<td>No</td>
<td>N = 0</td>
</tr>
</tbody>
</table>

Supplement users had higher mean attitude scores than those that did use fish oil supplements and thus more positive attitudes towards the influence diet, omega-3 PUFAS and supplements have with regard to rheumatoid arthritis. This result was statistically significant (Mann-Whitney, p=0.001).

Discussion and Conclusion
This study found a high prevalence of fish oil supplement use in individuals with rheumatoid arthritis. Supplement users had an average intakes of 540mg EPA and 360mg DHA, these intakes are substantially less than >3g/day, minimum dose required to elicit therapeutic effects (Abdulrazzaq et al., 2017). Despite this many perceived that using supplements had a beneficial effect and satisfaction levels were high. The majority of users highlighted pain and inflammation as the principal reason for taking supplements. Websites and self-help forums were the primary source of information. Lack of trusted information was highlighted as a major concern and few had discussed supplements with their healthcare professional.

In conclusion, this study confirms the high prevalence of dietary supplement use by individuals with RA. Despite misalignment between the evidence base and the intakes in this study many still perceive taking supplement to benefit their condition. Healthcare professionals should be aware of the prevalence of supplement use and ensure up to date knowledge of the potential benefits and risk so they can be best place to provided patients with trusted information so they can make informed decisions on supplements.
### SPSS Output

#### Tests of Normality

<table>
<thead>
<tr>
<th></th>
<th>Kolmogorov-Smirnov&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Shapiro-Wilk</th>
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<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>df</td>
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<tr>
<td>Attscore</td>
<td>.137</td>
<td>49</td>
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</table>

<sup>a</sup> Lilliefors Significance Correction

#### Hypothesis Test Summary

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Test</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 The distribution of Symptom scale is the same across categories of Gender.</td>
<td>Independent-Samples Mann-Whitney U Test</td>
<td>.001&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Reject the null hypothesis.</td>
</tr>
</tbody>
</table>

Asymptotic significances are displayed. The significance level is .05.

<sup>1</sup>Exact significance is displayed for this test.

#### Independent Samples Test

<table>
<thead>
<tr>
<th>Attscore</th>
<th>Levene’s Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
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<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
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<tr>
<td>Attscore</td>
<td>.129</td>
<td>.721</td>
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<tr>
<td></td>
<td>Equal variances assumed</td>
<td>4.514</td>
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<tr>
<td></td>
<td>Equal variances not assumed</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Equal variances not assumed</td>
<td>.000</td>
</tr>
</tbody>
</table>

#### Independent Samples Test

<table>
<thead>
<tr>
<th>Attscore</th>
<th>t-test for Equality of Means</th>
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<tbody>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td>Attscore</td>
<td>.000</td>
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<td></td>
<td>Equal variances assumed</td>
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</table>

#### Independent Samples Test

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<tr>
<th>Attscore</th>
<th>95% Confidence Interval of the Difference</th>
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<tr>
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<td></td>
<td>Equal variances assumed</td>
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L-methylfolate; L-glutamine