

# Principles and Practice of Clinical Research

A Global Journal in Clinical Research



# PPCR

ISSN: 2378-1890

## Effect of kinesio taping on improving pain in patients with patellofemoral pain syndrome: a meta-analysis

M. Al-Muhannadi<sup>1,2\*</sup>, K. Al-Karbi<sup>1,2</sup>, K. Al-Khelaifi<sup>3</sup>, H. Al-Qaatri<sup>2</sup>, MH. Mahmoud<sup>1,2</sup>, F. Al-Hor<sup>1,2</sup>, M. Taher<sup>1,2</sup>

<sup>1</sup>Primary Health Care Corporation, Qatar

<sup>2</sup>Family Medicine Training Department, Qatar

<sup>3</sup>Orthopedics and Sport Medicine Hospital, Aspetar, Qatar

\*Corresponding authors: Muneera Al-Muhannadi, Family medicine specialist, Primary Health Care Corporation, Qatar. Email: maalmuhannadi@phcc.gov.qa

Received June 8, 2021; accepted August 5, 2021; published August 24, 2021.

### Abstract:

**Objective:** to evaluate randomized controlled trials and perform a meta-analysis to assess the efficacy of kinesio taping in patellofemoral knee pain, in comparison to other treatment modalities.

**Methods:** meta-analysis of randomized controlled trials (RCTs) investigating the effect of Kinesio taping on Patellofemoral pain syndrome (PFPS). Medline and Cochrane library were searched for relevant RCTs from January 2000 to December 2020. Reference lists were manually checked. Published RCTs comparing kinesio taping and other treatment modalities in adolescents and adults with patellofemoral pain syndrome were eligible for the conclusion. The studies were selected, and their quality was assessed by two review authors. Standardized mean difference (SMD) was used to analyze the continuous outcome using a random effect model.

**Results:** the studies combined included 250 subjects. There was no significant difference between the two groups at rest (SMD=0.26, 95%CI (-0.79, 1.3), z=0.48, p=0.63). Subgroup analysis investigating pain while resting, walking, ascending stairs, and descending stairs was conducted and showed pooled inferior effect when compared to non-taping treatment (SMD=0.38, 95%CI (0.12, 0.65), z=2.85, p=0.004).

**Conclusion:** the kinesio taping method does not seem to be effective in reducing knee pain in patients with patellofemoral pain syndrome.

**Keywords:** kinesio taping, patellofemoral pain syndrome, VAS, meta-analysis

DOI: <http://dx.doi.org/10.21801/ppcrj.2021.72.6>

### Abbreviations:

PFPS: Patellofemoral pain syndrome

VAS: Visual Analog Scale.

RCTs: Randomized Controlled Trials.

### INTRODUCTION

Patellofemoral pain syndrome (PFPS) is one of the most common knee problems, especially in young females. It

presents as anterior knee pain that increases with sitting, squatting, and going up and down the stairs. The cause of this syndrome is believed to be multifactorial (Kurt et al., 2016), where structural and behavioral risk factors play an important role in its pathology. It is reported that 40% of visits for knee problems to the clinic are attributed to PFPS ((Halabchi, Abolhasani, Mirshahi and Alizadeh, 2017).



**Figure 1.** Application of K Taping on a knee with Patellofemoral pain syndrome (Demirci, Kinikli, Callaghan and Tunay, 2017)

Many treatment modalities have been practiced in the management of PFPS. Non-interventional treatment has been the most accepted. These include physiotherapy, structured muscle strengthening exercise, ultrasound, electrical stimulation, bracing, and taping. Taping is becoming increasingly one of the most used approaches. It is applied to the muscle with tension in specific areas (**Figure 1**). The mechanism of action increases the proprioception of the skin, to direct fascia tissue, and bring it upward to create a space for blood and fluids to pass, and to limit the friction (Aytar et al., 2011). This treatment modality is considered a cost-effective method, where there are no adverse effects and is not time-consuming. However, knowledge and manual experience by the applicator is needed.

However, there was no agreement on the efficacy of Kinesio taping in the reduction of knee pain in patients with PFPS. A systematic review was done that concluded the high effectiveness of taping as an addition to exercise therapy, but not alone (Logan et al., 2017). However, no statistical analysis is available to verify results. A meta-analysis was done where Kinesio taping was compared to McConnell taping, where it was concluded that the Kinesio taping can reduce pain but not change the patellar alignment in comparison to the other (Chang et al., 2015).

The current meta-analysis was done to assess the efficacy of kinesio taping use in patients with PFPS, in comparison to other treatment modalities in adolescents and adults.

## METHODS

### Search strategy

An electronic literature search was performed by two reviewers for RCTs assessing the use of kinesio taping as a treatment for patellofemoral pain syndrome in adults. The electronic databases include Pubmed and Cochrane. The date was restricted from Jan 2000 until December 2020. The following text terms were used, "kinesio taping", "patellofemoral pain syndrome", "kinesiotaping" and "randomized controlled trials". The reference list of all studies included was checked manually. The detailed retrieval process is shown in **Figure 2**.

### Inclusion criteria

Published Randomized controlled trials (RCTs) of English language, that compared the use of kinesio taping to other treatment modalities (physiotherapy and placebo k-taping) adolescent and adults older than 12 years with patellofemoral pain syndrome were included, provided (1) assessment of knee pain using numerical scales (VAS) as the outcomes reported, (2) the control group including other treatment modalities.

### Exclusion criteria

Studies that evaluated the use of kinesio taping in knee disorders other than patellofemoral pain syndrome were excluded from the meta-analysis. Also, the use of other types of taping like McConnell and non-elastic adhesive taping were excluded. Five studies were excluded due to different interventions. Cross-over studies were excluded to limit carry-over effect (**Figure 2**)

### Data extraction

Two independent reviewers have searched and applied both the inclusion and the exclusion criteria. Data extraction from all studies was done separately. Later, the data (characteristics, design, and outcomes) were collected for final review among the 2 reviewers for final agreement to be included and analyzed.

### Risk of bias and quality assessment

The methodological quality of controlled trials was assessed using the modified jaded scale, in which points are given for eight key methodological features of

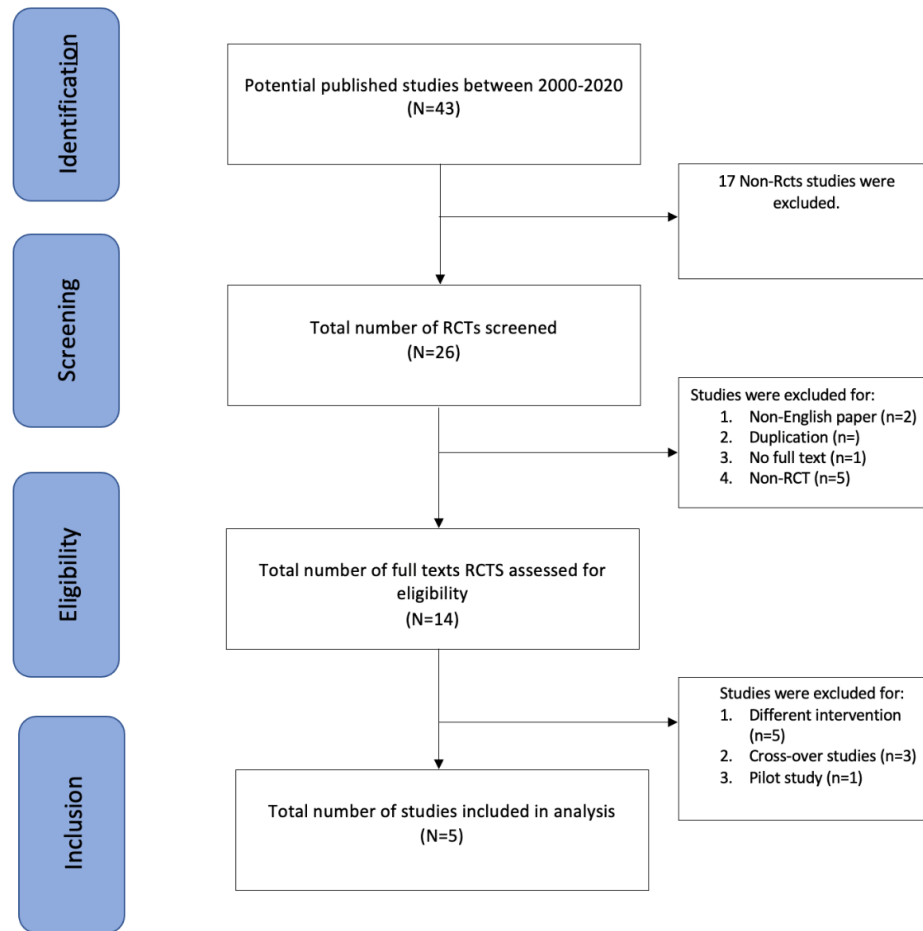


Figure 2. PRISMA flow chart for search strategy and study selection

clinical trials, which are randomization, blinding, subjects follow-up, inclusion, exclusion criteria, adverse events, and statistical analysis. An overall score of eight is given. Studies with more than or equal to 5 points are considered high-quality studies.

### Statistical analysis

RevMan 5.1 was used for meta-analysis. The continuous variables were analyzed by standardized Mean Difference (SMD) and 95% confidence interval (CI). As one of the studies used median and range (Gunay, 2017), we converted median and range to mean and standard deviation respectively using statistical tests proposed by (Hozo, Djulbegovic and Hozo, 2005).

The chi-squared statistic and the I2 statistic were used for the assessment of heterogeneity. A  $P < 0.05$ .  $I^2 > 50\%$  was considered as a significant heterogeneity. A random-effect model was used. A funnel plot was used to show publication bias. (Figure 5)

Subgroup analysis was done to identify differences in pain among four groups, which are resting, walking, ascending, and descending stairs.

## RESULTS

### Study selection

Studies were selected after going through the process of identification, screening, eligibility, and inclusion. The flow process is shown in Figure 2. Initially, a total of 43 potential studies were identified. Exclusion criteria were applied and a total of 6 studies were included in the analysis.

### Study and patient characteristics

Table 1 shows the characteristics of all 5 suitable studies included in the meta-analysis. The number of total participants in the intervention group is 127 and in the control group 123. Most of the patients were female, and the mean age ranged from 22-44 years. All the studies were published between 2011 and 2020.

| Study   | Year | Design | Number of participants | Mean Age     | Intervention   | Comparison                 | Outcomes              |
|---------|------|--------|------------------------|--------------|----------------|----------------------------|-----------------------|
|         |      |        | (KT/control)           | (KT/control) |                |                            |                       |
| Akbas   | 2011 | RCT    | 15/16                  | 41/44.8      | Kinesio-taping | Exercise only              | Visual analogue scale |
| Aytar   | 2011 | RCT    | 12/10                  | 22.4/26.2    | Kinesio-taping | Placebo KT                 | visual analogue scale |
| Kurt    | 2016 | RCT    | 55/51                  | 31.6/30.9    | Kinesio-taping | Placebo KT                 | Visual analogue scale |
| Demirci | 2017 | RCT    | 20/21                  | 36.7/37.5    | Kinesio-taping | Mobilization with movement | Visual analogue scale |
| Gunay   | 2017 | RCT    | 25/25                  | 33.8/36      | Kinesio-taping | exercise alone             | Visual analogue scale |

Table 1. Study Characteristics

**Quality assessment**

The 5 articles were assessed using the modified jaded score. (Table 2). Four of them mentioned and used appropriate methods of randomization. Two studies were double-blinded. However, all the studies had good accounts for patients where withdrawals and follow up were appropriately mentioned.

| Jaded score criteria             | Akbas, 2011 | Aytar, 2011 | Kurt, 2016 | Demirci, 2017 | Gunay, 2017 |
|----------------------------------|-------------|-------------|------------|---------------|-------------|
| Randomization done               | 1           | 1           | 1          | 1             | 1           |
| Appropriateness of randomization | 1           | 0           | 0          | 1             | 1           |
| Blinding                         | 1           | 1           | 1          | 0             | 1           |
| Appropriateness of blinding      | 0           | 0           | 0          | 0             | 0           |
| Follow up of patients            | 1           | 1           | 1          | 1             | 1           |
| Inclusion and exclusion criteria | 1           | 1           | 1          | 1             | 1           |
| Method to assess adverse events  | 1           | 0           | 0          | 0             | 0           |
| Use of statistical analysis      | 1           | 1           | 1          | 1             | 1           |
| <b>Total score</b>               | <b>6/8</b>  | <b>5/8</b>  | <b>5/8</b> | <b>5/8</b>    | <b>6/8</b>  |

Table 2. Description of modified Jaded score assessment.

**Outcome of meta-analysis**

Five studies were included in this meta-analysis. A total number of 250 subjects were included, 123 in control and 127 in intervention. Modified Jaded score was used to check the quality of the RCTs. 3 studies (Aytar, 2011,

Kurt, 2016 and Demirci, 2017) scored 5/8 in the modified jaded score, while, Akbas (2011) and Gunay (2017) scored 6/8 in the modified jaded score.

Four studies Akbas (2011), Kurt (2016), Demirci (2017), and Gunay (2017) have reported VAS score at rest. Significant heterogeneity was reported (Chi2=39.21, df=4, p<0.00001, and I2=90%) as demonstrated in Figure 3; therefore, a random effect model was used. The pooled results have demonstrated no significant effect with using kinesio taping in treating PFPS.

A subgroup analysis investigating the effect of kinesio taping in walking, ascending, and descending stairs was performed. There was no significant heterogeneity observed in all activities, therefore, a fixed-effect model was used.

In assessing pain during walking, two studies showed that there was no significant difference between groups (SMD=0.3, 95 % CI (-0.24, 0.85), P 0.27). There was no improvement in terms of symptoms associated with using kinesio taping (Chi2=0.88, df=1, p=0.35).

As for ascending stairs, three studies were included (Akbas (2011), Aytar (2011), and Demirci (2017)), and analysis showed no significant difference between groups (SMD=0.32, 95 % CI (-0.10, 0.75), P 0.14). Assessment of heterogeneity was done through chi-square test and I2 showing low heterogeneity. Chi2=1.81, df=2, p=0.41, and I2=0%. (Figure 4).

Finally, in assessing pain after descending stairs, three studies were included Akbas (2011), Aytar

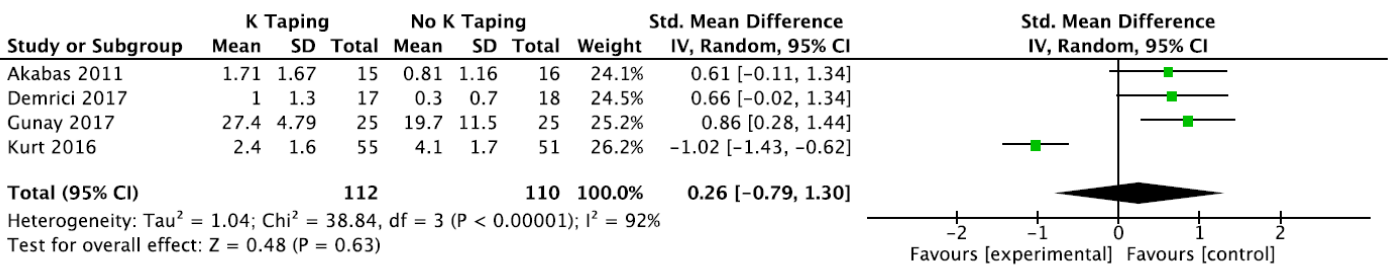


Figure 3. Effect of Kinesio taping at rest.

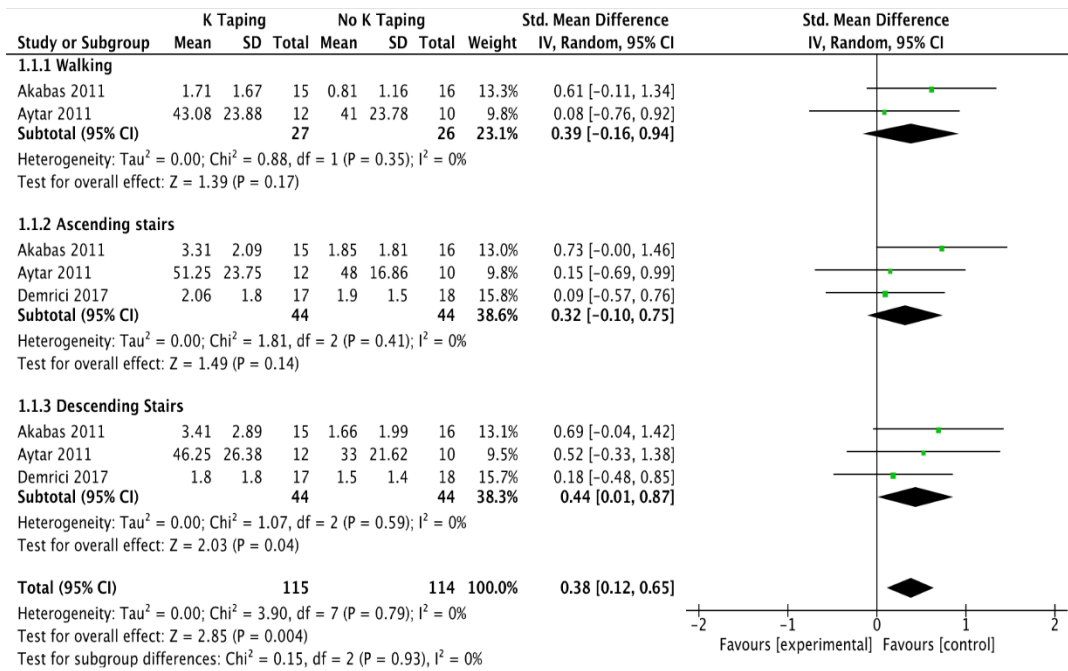


Figure 4: Subgroup analysis for walking, ascending and descending stairs.

(2011), and Demirci (2017), and analysis showed a significant difference between groups favoring non-k taping (SMD=0.44, 95 % CI (0.01, 0.87), P 0.04). Assessment of heterogeneity was done through chi-square test and I2 showing low heterogeneity. Chi2=1.07, df=2, p=0.59, and I2=0%. (Figure 4).

There was an overall significant difference between the two groups (kinesio taping vs non-kinesio

taping) towards the non-taping group (P value of 0.004).

Figure 5 shows the funnel plot of this meta-analysis. The studies' distribution is symmetrical; therefore, it is unlikely to have publication bias.

**DISCUSSION**

Kinesio taping was compared to other treatment modalities in patients with patellofemoral pain

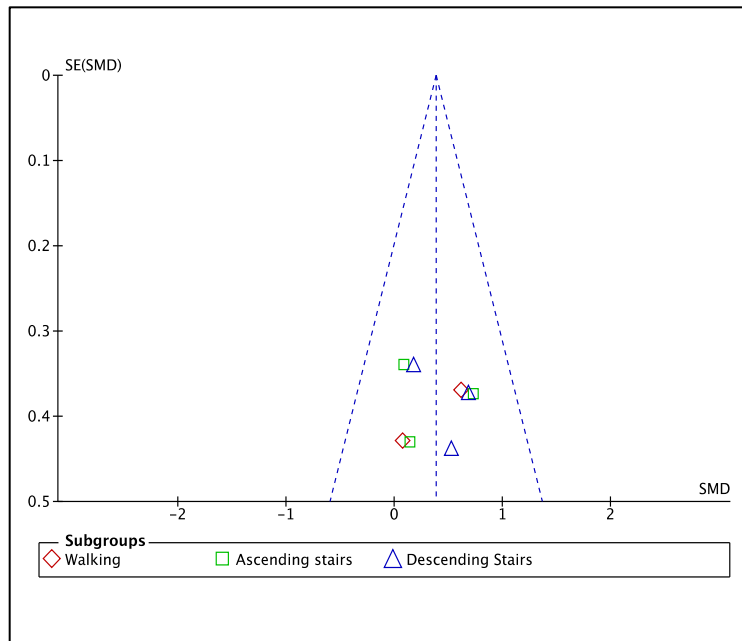


Figure 5. Funnel Plot.



syndrome. Knee pain was assessed at rest using the VAS pain scale. The analysis showed no significant difference between kinseo taping and non kinseo taping group when assessed at rest. However, the overall effect of kinesio taping in other activities (walking, ascending and descending stairs) demonstrated a superior effect of other treatment modalities (physiotherapy and placebo) when compared to kinesio taping ( $p$  value = 0.004).

Five articles were included in the meta-analysis, and they were superior in quality, ranging from 5 to 6 in the modified jaded score, however, there were some limitations in these studies that might influence the validity of the results. Most of the articles found eligible had a few numbers of participants and the majority were females. Also, a limitation in this review is the type of intervention which depends on the application and skill of the personnel who apply the taping. This might vary from one person to the other depending on his/her knowledge and experience. The outcome measure chosen can be subjective and patient perception of pain which, might significantly vary. Blinding is quite difficult to apply and might lead to bias in the results. Baseline pain levels are variable in between studies where this could be an indication of different levels of severity of patellofemoral knee disease which is not defined by authors of studies. Furthermore, the duration of the trials was different, and this might have caused the heterogeneity observed in the results. Finally, there was no obvious publication bias noted in the funnel plot, however, this can be challenged by the small number of articles included in the meta-analysis and the fact that trials with negative results are unlikely to be published.

The generalizability of the findings can be affected by the above-mentioned limitations, especially since most of the patients were young females. To address these challenges, an increase in the number of studies included, and therefore the sample size is recommended in further analysis. A different age group and gender are preferable for better generalizability. Objective outcomes such as imaging, a measure of anatomical structural changes can be considered.

Since Kinesio taping has a good safety profile, is cost-effective, and is easy to use and apply, a recommendation to use it can still be considered regardless of the absence of statistical significance. However, this must be done in the context of clinical decisions and as an adjuvant to other treatment modalities.

## CONCLUSION

Kinesio taping was found to be not effective in alleviating the pain associated with PFPS at rest, walking and ascending stairs. On the other hand, it was inferior to other treatment modalities in descending stairs. Due to the limited number of trials performed on kinesio taping on PFPS and the low number of participants in the included studies no reliable indications to use kinesio taping in treating PFPS can be advised.

## Conflict of interests

No conflict of interest

## REFERENCES

- AKBAS, E., ATAY, A. and YÜKSEL, I., 2011. The effects of additional kinesio taping over exercise in the treatment of patellofemoral pain syndrome. *ACTA ORTHOPAEDICA et TRAUMATOLOGICA TURCICA*, 5(45), pp.335-341.
- Arrebola, L., Carvalho, R., Wun, P., Oliveira, P., Santos, J. and Pinfield, C., 2019. Investigation of different application techniques for Kinesio Taping® with an accompanying exercise protocol for improvement of pain and functionality in patients with patellofemoral pain syndrome: A pilot study. *Journal of Bodywork & Movement Therapies*, 24, pp.47-55.
- Aytar, A., Ozunlu, N., Surenkok, O., Baltaci, G., Oztop, P. and Karatas, M., 2011. Initial effects of kinesio® taping in patients with patellofemoral pain syndrome: A randomized, double-blind study. *Isokinetics and Exercise Science*, 19(2), pp.135-142.
- Chang, W., Chen, F., Lee, C., Lin, H. and Lai, P., 2015. Effects of Kinesio Taping versus McConnell Taping for Patellofemoral Pain Syndrome: A Systematic Review and Meta-Analysis. *Evidence-Based Complementary and Alternative Medicine*, 2015, pp.1-11.
- Demirci, S., Kinikli, G., Callaghan, M. and Tunay, V., 2017. Comparison of short-term effects of mobilization with movement and Kinesiotaping on pain, function and balance in patellofemoral pain. *Acta Orthopaedica et Traumatologica Turcica*, 51(6), pp.442-447.
- Günay, E., 2017. Effectiveness of the kinesiotaping in the patellofemoral pain syndrome. *Turkish Journal of Physical Medicine and Rehabilitation*, 63(4), pp.299-306.
- Halabchi, F., Abolhasani, M., Mirshahi, M. and Alizadeh, Z., 2017. Patellofemoral pain in athletes: clinical perspectives. *Open Access Journal of Sports Medicine*, Volume 8, pp.189-203.
- Hozo, S., Djulbegovic, B. and Hozo, I., 2005. Estimating the mean and variance from the median, range, and the size of a sample. *BMC Medical Research Methodology*, 5(1).
- Kurt, E., Büyükturan, Ö., Erdem, H., Tuncay, F. and Sezgin, H., 2016. Short-term effects of kinesio tape on joint position sense, isokinetic measurements, and clinical parameters in patellofemoral pain syndrome. *Journal of Physical Therapy Science*, 28(7), pp.2034-2040.
- Logan, C., Bhashyam, A., Tisosky, A., Haber, D., Jorgensen, A., Roy, A. and Provencher, M., 2017. Systematic Review of the Effect of Taping Techniques on Patellofemoral Pain Syndrome. *Sports Health: A Multidisciplinary Approach*, 9(5), pp.456-461.