CONGRESS

RIMAR II

مؤتمر ريمار الدولي الثاني
للعلوم الصرفة والتطبيقية

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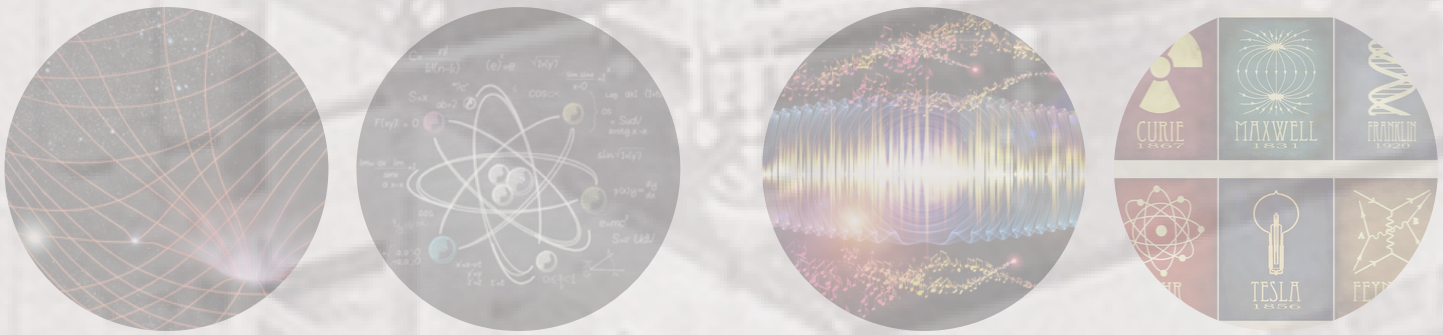

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PREFACE

The 2nd IInternational Rimar Congress of Pure, Applied Sciences "RIMAR CONGRESS", was organized by Istanbul Gedik University in collaboration with Remar Academy. The primary objective of this event was to compile and disseminate valuable scientific knowledge and make a meaningful contribution to the future.

Remarkably, a substantial number of researchers, both from local and international backgrounds, demonstrated their interest in this conference. The scientific committee meticulously reviewed the submissions and ultimately accepted a select group of individuals, totaling 35 applicants, 30 of them were accepted by the scientific committee.

This conference was truly a global endeavor, as it drew participation from 8 attendees who joined in person, alongside 8 who engaged in the event remotely. These participants collectively enriched the conference with their expertise and insights.

The core of this conference was the presentation of 16 complete research papers, while the remaining articles and research findings are set to be featured in forthcoming issues of the MINAR Journal.

I would like to extend my sincere appreciation to all the contributors and scholars who played an essential role in making this conference a resounding success. Your dedication and valuable contributions are deeply respected and acknowledged.

Editor-in-Chief
Prof. Dr. Ghuson H. MOHAMMED

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استخدام طريقة تحليل المسار لايجاد الرضا والأداء الوظيفي

Using path analysis method to find satisfaction and job performance

Inas Abdulameer Abbood [1]

الملخص

ان لاستخدام المنهاج التحليلي لدراسة مسار العلاقة بين المتغيرات في نموذج سببي مقترح من خلال تقديرمعاملات المسار باستخدام تحليل الارتباط وتحليل وحساب معاملات الارتباط بين المتغيرات ، باستخدام برنامج SPSS/AMOS لما له من مزايا كثيرة في استخداماته خصوصاً في الجانب التمثيلي للنماذج ، حيث قامت الدراسة باستخدام المتوسط الحسابي والانحراف المعياري والتحليلي العاملي التوكيدي، والتحليل العاملي البنائي (تحليل المسار)لقياس فرضيات الدراسة، وفي نهاية التحليل قامت الدراسة بتفسير النتائج التي اظهرت بوجود علاقة قوية بين تقييم الاداء والولاء والرضا الوظيفي وتاثيرة على اداء المنتسبين بشكل مباشر في المنظمة عينة الدراسة التي تم حصولنا عليها عن طريق الاستبيانة الالكترونية لعينة (150) من الكوادر العاملة في الجانب الصحي(مستشفى مدينة الطب) لأهمية الجانب الصحي وتاثيره على الجميع وسعي الدول الدائم للارتقاء بهذا الجانب .

الكلمات المفتاحية : تقييم الاداء ; الولاء والرضا الوظيفي ; تحليل المسار

Abstract

To use the descriptive analysis to study the path of the relationship between variables in a proposed causal model by estimating path coefficients using correlation analysis and analyzing and calculating correlation coefficients between variables, using the SPSS/AMOS program because of its many advantages in its uses, especially in the representational aspect of the models, as the study used the average Arithmetic, standard deviation, confirmatory factor analysis, and structural factor analysis (path analysis) to measure the study's hypotheses. At the end of the analysis, the study interpreted the results, which showed that there was a strong relationship between performance evaluation, loyalty, and job satisfaction, and their impact on the performance of employees directly in the organization The sample of the study that we obtained through an electronic questionnaire was for a sample of (150) of the staff working in the health aspect (Medical City Hospital) due to the importance of the health aspect and its impact on everyone and the countries' constant endeavor to improve this aspect.

Keywords: Performance Evaluation; Loyalty and Job Satisfaction; Path Analysis

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المقدمة

الجانب الصحي من الجوانب المهمة التي تسعى كافة الدول للارتقاء به لما له تاثير مباشر على الجميع خاصة بعد جائحة كرونا ودورهم المميز بيه فنسعى دائما لقياس الاداء والحصول على الرضا الوظيفي للتحسين, فمؤشر قياس الاداء عبارة عن مقياس وضع لمعرفة وقياس الوضع الحالي لعمل المنظمات وهل يوجد تحرك فعلي تجاه الاهداف الموضوعه ام لا , يتم استخدامة بكثرة وعلى كل ما يمكن قياسة ولا يمكن تحسينه، ان الهدف من عملية تقييم الاداء اعطاء الاداء المنجز للمؤسسات قيما يعبر عن مستوى هذا الاداء وبالتالي يمكن ان يستخدم كاساس للتعرف على مستوى المنظمة في تحقيقها لاهدافها ، ولاجل الوصول الى عملية تقويم للاداء يمكن ان تعطي ثمارها لا بد من ايجاد ارضية مناسبة لتقييم الاداء في المؤسسة المطلوب تقييمها ومن ثم الانتقال الى عملية التقويم على اختلاف مراحلها ابتداءا بتحديد الاهداف وانتهاءا باجراءات حساب المعايير اللازمة للتقييم وحساب القيمة النهائية للأداء.

دائما كافة المنظمات تبحث عن حل لضمان تنفيذ الستراتيجية الموضوعة لها واسلوب التقييم وسيلة للتحكم بتنفيذها فمعرفة وقدرة الموظف وجودة الخدمة قيمة كبرى اكثر من قيمة الاصول المادية،وبسبب التغيرات السريعة والضغط المصاحب لهذه التغيرات أزداد اهتمام العديد من المنظمات لفكرة تبني مفهوم الادارة الحديثة والتي تركز على العامل البشري باعتباره أهم هذه العوامل التي تساهم على تحسين مستوى اداء المنظمة بشكل كبير (Micheli, P., & Pavlov, A., 2020) .

وسلط (Kumar, P. J., & Kumar, A. A., 2017) الضوء على تأثير الهياكل التنظيمية على أداء الموظفين. وحدد أربعة هياكل رئيسيةهي دعم أداء الموظفين من خلال الموارد والفرص وتعزيز النمو الشخصي من خلال التدريب والتطويروتعزيز البيئة الداعمة للموظفين واكد على أهمية وجود هيكل تنظيمي داعم لرضا الموظفين لزيادة انتاجهم .

ويُعتبر أسلوب تحليل المسار من الأساليب الإحصائية المهمة التي تعطي الباحث معلومات أكثر من التي يعطيها معامل الارتباط ،يعمل تحليل المسار على إيجاد علاقات سببية بين المتغير اللمستقل والمتغير التابع من خلال نظام المسارات وتجزئت معاملات الارتباط الى تأثيرات غيرمباشرة و مباشرة.

تحليل المسار هو طريقة لتمييز وتقييم تأثيرات مجموعة من المتغيرات التي تعمل على نتيجة محددة عبر مسارات سببية متعددة ، وهي تقنية لتحديد وتقييم تأثيرات مجموعة من العوامل التي تعمل على نتيجة محددة عبر سببية مختلفة الطرق حيث تعتبر سابقة ومجموعة فرعية من نمذجة المعادلة الهيكلية. استغرق تحليل المسار بعض الوقت لاكتساب قوة دفع ولكن في النصف الأخير من القرن العشرين أبدى علماء الاجتماع والاقتصاديون اهتمامًا كبيرًا به واعتمد علماء الأوبئة الذين يدرسون التاريخ الاجتماعي وتاريخ الحياة هذا النهج في وقت لاحق وهو الآن من بين أفضل التقنيات الإحصائية المستخدمة في الكثير من العلوم.

المبحث الاول /منهجية البحث

أولا : مشكلة البحث

إن أهمية أداء وتقييم المنظمات يشكل أهمية أساسية لأي منظمة من خلال إدارة الموارد البشرية، وليس فقط من أجل السرعة والكفاءة بل إنه أمر ضروري لتطور الموظفين والتكيف مع التغييرات في عملهم، وكذلك لكي تظل المنظمة قادرة على المنافسة وتقديم الافضل ولصعوبة معرفة الرضا الوظيفي والاداء الحقيقي للمنظمات لضرورة تشجيع الموظفين بوضع نظام فعال من خلال برنامج يحقق العدالة فتم استخدام اسلوب تحليل البيانات المتمثل في تحليل المسارpath Analysis لدراسة تقييم كفاءة الاداء للجانب الصحي لاهميته الكبيرة في حياتنا ولدورهم بمواجهه الضغوطات والتحديات الكثيرة لهذه المنظمة.

ثانيا :هدف البحث

1- وضع ضوابط لاحتساب مؤشرات التقويم بالطريقة التي تضمن دقة هذه المؤشرات وعدم تعرضها للتحوير لتشكل مع معادلة تقويم اداء نظاما وافيا لتقويم الاداء.
2- تقييم مدى الاستفادة العملية من تقارير تقويم الاداء والوصول الى الولاءوالرضا الوظيفي.
3- امكانية ربط الاسس النظرية لتقويم الاداء مع مؤشرات على المستوى العلمي والخروج بفائدة عملية على اداء المنظمة.

ثالثا : أهمية البحث

تكمن أهمية البحث في كيفية تاثير العناصر البشرية لتزايد اهميتهم في اي منظمة من خلال الولاء والرضا الوظيفي وتاثيرة على المنظمة ونتيجة التغيرات السريعة خاصة في السنوات الاخيرة التي أثرت بشكل إيجابي على أداء الموظفين، مما أدى إلى الازدياد بتبني مفاهيم الإدارة الحديثة وأهمية بناء الثقة المتبادلة بين القيادة والموظفين ،وأصبحت مشاركة وتمكين الموظفين موضوع مهم ومتزايد للاهتمام لتحفيزهم في اتخاذ القرار والمشاركة مما يؤدي لاداء افضل على المدى القريب والبعيد .

ويساهم تمكين الموظفين في تعزيز دوافع الإنجاز بين الموظفين من خلال الممارسات الإدارية الإيجابية، مثل الديمقراطية الإدارية، وروح الفريق، وتفويض الصلاحيات، وتفعيل المعرفة، وتوفير المعلومات خاصة في الجانب الصحي لتاثيرة المباشر في المجتمع.

إن تطبيق هذه المفاهيم في المنظمات العامة سوف يؤثر على أسلوب القيادة، والهياكل التنظيمية، وأنظمة الحوافز، وتصميم هيكل الأجور، ومؤشرات الأداء الرئيسية، ونطاق الإشراف، واحتياجات التدريب، ومعايير الترقية للمناصب الإدارية العليا ومعرفة الدوافع التي تدفع إلى تبني هذه المفاهيم والاستجابة بشكل كبير للمنظمة وتوقعات المرضى ، والتركيز على القضايا الاستراتيجية، وتبسيط الإجراءات، وتعزيز الولاء المؤسسي، وإعطاء الموظفين مسؤوليات وإنجازات أكبر.

رابعا :فرضيات البحث

يقوم البحث على فرضيات أساسية وهي

1- عدم وجود تاثير معنوي ذو دلالة احصائية بنسبة (0,05) بعدم وجود علاقة ذات دلالة احصائية بين تقيم الاداء الوظيفي والولاء للموظفين العاملين بالمنظمة.

2- وجود فرق دو دلالة اخصائية بنسبة (0,05) بوجود علاقة ذات دلالة احصائية بين تقييم الاداء والولاء الوظيفي.

3- هل توجد علاقة بين تقييم الاداء والالتزام الوظيفي .

4- هل توجد علاقة بين البيانات الشخصية وتقييم الاداء.

خامسا : حدود البحث

حدود البحث تتكون من اربع مراحل رئيسية هي:

1- مرحلة المراجعة المنهجية حيث تم الاطلاع على الدراسات السابقة لها علاقة بموضوع البحث لقطاعات اخرى

2- مرحلة جمع البيانات اعتمد البحث على بيانات خاصة بقطاع الصحة المتمثل ب150 موظف من خلال الاستبيانة الالكترونية للفترة من 2023/9/1 لغاية 2024/1/1.

3- مرحلة التصميم والتحليل تم إدخال البيانات وتنظيمها وتحليلها باستخدام الحزمة الإحصائية للعلوم الاجتماعية (SPSS) .

4- مرحلة التحقق من مصداقية البيانات وتفسير النتائج والاستنتاجات

سادسا: أداة جمع البيانات

لجمع البيانات تم استخدام الاستبيان الالكتروني وقد تكونت من أربعة أجزاء :

- الجزءالاول: يحتوي على 4 متغيرات وهي (العمر ،الجنس ،المستوى التعليمي ،عدد سنوات الخبرة).
- الجزء الثاني :يحتوي على 14 فقرة لقياس متغيرات الدراسة تقييم الاداء للموظفين.
- الجزء الثالث :يحتوي على 11 فقرة لقياس الرضا والولاء الوظيفي.
- الجزء الرابع :يحتوي على 11 فقرة لقياس الالتزام الوظيفي للموظف بعملة .

تم استخدام المقياس الخماسي لتحديد درجات الموافقية على العبارات وكالآتي

جدول 01 – المقياس الخماسي

العبارة	موفق بشدة	موفق	محايد	غير موافق	غير موافق بشدة
درجة الموافقة	5	4	3	2	1

سابعا : الدراسات السابقة

1. في عام 2017 قدم Wu, C. H., Chen, I. S., & Chen, J. C. دراسة بعنوان [1]

(A study into the impact of employee wellness and job satisfaction on job performance)

لمعرفة اثر صحة العاملين والرضا الوظيفي على الاداء واعتمدت الدراسة على منهج الاستبيان وارسلت الى مؤسسات في تايوان التي كانت توظف 100 موظف بدوام كامل بالاضافة الى منظمات ربحية وغير ربحية وبينت الدراسة الاثر الايجابي الواضح لصحة الموظف واثره الملحوظ على الرضا الوظيفي وبالتالي تاثيرة على الاداء الوظيفي

2. وقدم الباحث Demir, S علم 2020 بحثا بعنوان[2]

(The role of self-efficacy in job satisfaction, organizational commitment, motivation and job involvement)

حيث بين فيه ان كلما زاد معتقد المعلمين بالكفاءة الذاتية والمخرجات وتاثير التحفيزوالمشاركة الوظيفية زاد رضاهم الوظيفي حيث تالفت عينة البحث من 321 معلما من 33 تم اختيارهم عشوائيا لمدارس بمدينة هاتاي للعام الدراسي 2017-2018 باستخدام طريقة العينة العنقودية حيث تبين ان مديروا المدارس لهم اثر في تعزيز الكفاءة الذاتية والمواقف الايجابية تجاههم لزيادة الرضا الوظيفي وزيادة الكفاءة وفاعلية العمل وتنبأت بدور المعلمين برضاهم الوظيفي والتزامهم التنظيمي ودوافعهم بزيادة انخراطهم في العمل،تم استخدام برنامج SPSS وتم تحديد البيانات بانها ذات توزيع خطي وطبيعي وتم الاستفادة من AMOS لتحليل العوامل التأكيدية ونمذجة المعادلات الهيكلية .

3. وقدم كلا من Bryan, V., & Vitello-Cicciu, J دراسة في عام 2022 بعنوان [3]

(Perceptions of preceptors' authentic leadership and final year nursing students' self-efficacy, job satisfaction, and job performance)

دراسة تبين علاقة ما بين القيادة للمعلم والممرض لقياس الكفاءة الذاتية للطالب والاداء الرضا الوظيفي للسنة النهائية لطلبة التمريض حيث تم جمع البيانات من 94 ممرض مرخص في الاستطلاع لفترة ثمانية اشهر ، طُلب من طلاب التمريض تقييم تصورهم لرضاهم عن التمريض كمهنة بناءً على خبرتهم في التدريب وتم واستخدم الإحصاءات الوصفية لتوفير قيم موجزة للعينة والترددات ومقاييس الاتجاه المركزي الخاصة بدرجات القيادة الأصيلة المدركة للمرشدين واستخدام اختبار t للعينات المقترنة لتحديد الاختلافات بين درجات الكفاءة الذاتية لطلاب التمريض قبل وبعد لفحص العلاقة بين القيادة والكفاءة والاداء والرضا الوظيفي حيث زادت الكفاءة الذاتية للطلاب بعد التدريس وارتبطت القيادة بالكفاءة الذاتية والرضا وبرزت الكفاءة الذاتية واثرت على القيادة تجربة التوجيه وتم استخدام معامل ارتباط بيرسون لتحديد الارتباط بين القيادة الأصيلة المدركة للمرشد والكفاءة الذاتية لطلاب التمريض والرضا الوظيفي والأداء الوظيفي.

4. وقدم الباحثان Goktas, S., Gezginci, E., & Kartal, H. في عام 2022 بحثا بعنوان[4]

(The effects of motivational messages sent to emergency nurses during the COVID-19 pandemic on job satisfaction, compassion fatigue, and communication skills)

دراسة تبين تاثير الرسائل المحفزة للكادر التمريضي خلال جائحة كوفيد -19 في تركيا على الرضا والاداء الوظيفي لكادر الطوارئ التمريضي خلال الازمة وانعزالهم عن الاسرة وزيادة ساعات العمل وعبء العمل والحماية والخوف من انتقال المرض والتفاعل السلبي مع اقارب المرضى هذه العوامل اثرت تاثير مباشر وسلبي على الكادر التمريضي جسديا ونفسيا ولان الدافعية لها تاثير على سلوك واداء الممرض المسؤول عن المرضى ولتحسين رضا الممرضات عن وظائفهن ومستويات تحفيزهن أمر ضروري لزيادة فعالية خدمات التمريض والتي تعد عنصرًا أساسيًا في الخدمات الصحية، عينة الدراسة تألف 89 ممرضة يعملن في أقسام الطوارئ في مستشفيين للتدريب والبحث (كلاهما مُصنف كمستشفيات للوباء) تابعين لوزارة الصحة في إسطنبول، تركيا، بين 31 يوليو 2021 و31 أغسطس 2021 تم تحليل البيانات باستخدام SPSS لقياس الاحصاءات الوصفية، فاظهر البحث الاستجابة العاطفية والرضا الوظيفي وزيادة الدافعية للعمل ر الدراسة ودور الرسائل التحفيزية المرسلة إلى ممرضات الطوارئ أثناء جائحة كوفيد-19 تزيد من رضا الوظيفة، وتحسن مهارات الاتصال، وتقلل من الاجهاد العاطفي والحفاظ على الدافعية بين الممرضات وخاصة اللاتي لديهن أعباء عمل عالية ومجموعات مرضى حرجة لتجنب المشاكل النفسية الاجتماعية .

5. في عام 2023 قدم كلا من Rossiandy, Y., & Indradewa, R دراسة بعنوان [5]

(The influence of self-efficacy on job satisfaction, organizational commitment, motivation and job performance in private school teachers)

بحثا للتعرف على دور المعلم وكفائتة الذاتية والتزامة والتحفيز التي تؤثرعلى الرضا والاداء الوظيفي في التعليم لعينة من التدريسين في رياض الاطفال للمراحل الابتدائية والاعدادية للعام الدراسي 2022-2023 باستخدام أسلوب أخذ العينات للمعلمون الذين لديهم خبرة تدريسية لا تقل عن ستة أشهر من المعلمين الذين يدرسون على المستويات الأربعة المنتشرة في جميع أنحاء إندونيسيا ،استخدم الباحثون تحليل العوامل لاختبار الصلاحية والموثوقية باستخدام برنامج SPSS،وتم التوصل أن كفاءة المعلمين الذاتية القوية تزيد من رضاهم الوظيفي من خلال تشجيعهم على تطوير أنفسهم وزيادة الإنتاجية كما يعزز الدعم من القادة وزملاء العمل الثقة بالنفس مما يؤدي إلى ارتفاع الرضا الوظيفي ومع ذلك فإن الكفاءة الذاتية لا تؤثر بشكل إيجابي على الالتزام التنظيمي حيث لا يرغب المعلمون ذوو الكفاءة الذاتية العالية في المشاركة بشكل مباشر في المشاكل التنظيمية وقد يوقفون تقدمهم الوظيفي بالإضافة قد يكون لدى المعلمين ذوي الكفاءة الذاتية العالية قيم فردية واضحة لا تتوافق مع قيم وثقافة المنظمة، مما يؤدي إلى عدم التوافق بين الفرد والمنظمة وبين ان الكفاءة الذاتية لها تاثير مباشر بشكل إيجابي على الدافعية حيث يمكن للمعلمين ذوي الكفاءة الذاتية القوية تقديم التشجيع لنيتهم في إعطاء أقصى النتائج للمهام وتحسين الأداء الوظيفي باستخدام تحليل المسار .

المبحث الثاني /الجانب النظري

1- **مفهوم تقويم الاداء :**

يمكن ان يحدد مفهوم تقويم الاداء بانه الاسلوب الذي يتم بموجبه تحديد مستوى نشاط اي منظمة لغرض قياس نتائج العمل ومقارنتها بالاهداف المرسومة له اصلا وبذلك فان عملية تقويم الاداء تستهدف تشخيص الانحرافات بين المتحقق والمستهدف وتشخيص اسبابها لغرض العمل على تجاوز هذه الانحرافات بوضع دلالات او مؤشرات للقياس من اجل الحكم على كفاءة اداء المنظمة بالاضافة الى ان دراسة كفاءة الاداء تتضمن النتائج المباشرة وغير المباشرة

للمنظمة واثارها على الاقتصاد العام وكون دراسة تقويم الاداء هي تشخيص للانحرافات فانها تشكل نظاما رقابيا لما تمكنه لاصحاب القرار من اتخاذ القرارات الصحيحة والاجراءات الوافية لتعميق مواطن القوة وازالة المعوقات وتصحيح مسار في مواطن الضعف بهدف رفع كفاءة الاداء وتحقيق الاستفادة القصوى من الموارد المتاحة وتقليص الهدر والضياع مما يؤدي الى تحقيق نتائج ايجابية كبيرة بصورة اعم واوسع لتشكيل مجمل عملية التنمية في البلد.[6]

يمكن اجراء عملية تقويم الاداء اثناء تنفيذ الخطط اي اثناء انجاز الاعمال لجعلها تساهم في معرفة الانحرافات انيا ويرى البعض ان التقويم يجب ان يتطلب فحص شامل للهيكل التنظيمي والخطط والاهداف والموارد المتاحة وطرق التشغيل، وبمعنى اخر عدم الاقتصار على النتائج النهائية فحسب بل يمتد الى تقويم التخطيط لمعرفة مدى ملائمتها لظروف المنظمة وامكانيتها ويمكننا ان نعطي مفهوم تقويم الاداء او يمكنه حصره باسلوب قابل للاتباع في القياس يمكن من خلال عملية تقويم الاداء تحديد مدى تحمل المسؤوليات الادارية .[7].

2- تحليل المسار

تعتبر طريقة تحليل المسار طريقة إحصائية ذات صلة تعتمد على تحليل الانحدار والارتباط المتعدد، والتي تستخدم لتحديد احتمالية وجود علاقة بين العديد من المتغيرات وفحصها في نظام المعادلات الخطية، سواء كانت المتغيرات متصلة أو منفصلة. ويمكن القول أن أسلوب تحليل المسار هو امتداد لتحليل الانحدار المتعدد ويستخدم عادة لدراسة العلاقات السببية، وهو يعتمد على معرفة الباحث لأنماط العلاقات بين المتغيرات المرتبط [8] قدمه سويل رايت Sewall Wright عام 1921 م عالم الوراثة في وزارة الزراعة الأمريكية هذه الطريقة منذ ما يقرب من قرن من الزمان حيث تضمنت استخداماته المبكرة تحديد أي عامل - درجة الحرارة ، أو الرطوبة ، أو الإشعاع ، أو سرعة الرياح - كان له أكبر تأثير على نتج النبات وحساب الإسهامات النسبية للجينات والبيئة في سمات مثل تلوين خنزير غينيا وفي مجال علم الأحياءخلال استخدامه في دراسة درجة العلاقة بين الأقارب وفي دراسة السلوك الوراثي لكثيرمن الصفات الوراثية[9] ، وانتشر هذا الأسلوب في بحوث العلوم الاجتماعية على يد العالم دانكان Duncan [10]وأوضح العالم Duncanعام 1966 م العلاقة بين المعادلات الهيكلية وتحليل المسار , ووضع بعض الأمثلة كأداة مساعدة لإجراء تحليل المسار في البحوث الاجتماعية ، وعام 1975 م غطى دانكان جميع جوانب المعادلات الهيكلية في تحليل المسار, واستخدم أسلوب تحليل المسار بصورة واسعة في العلوم البيئية عام 1970 م ، كما و قدم بلالوك Blalock أسلوب تحليل المسار في مجال الزراعة عام 1968.[11]

أساس تحليل المسار هو نظام مغلق من العلاقات المتداخلة بين المتغيرات التي يتم تمثيلها إحصائيًا بواسطة مجموعة من معادلات الانحدار الخطي جيدة التنظيم. تنطبق نفس مجموعة الافتراضات التي تنطبق على الانحدار الخطي أيضًا على تحليل المسار ، جنبًا إلى جنب مع بعض القيود الإضافية التي تحدد النمط المسموح به للعلاقات بين المتغيرات. لا تعتمد المتغيرات الخارجية على أي عوامل أخرى في النموذج ، في حين أن المتغيرات الداخلية لها تباين محدد بواسطة متغيرات أخرى في النموذج. قد يكون هناك أو لا يكون هناك ارتباط بين المتغيرات الخارجية.

قال رايت Wright: هدفنا ليس استخدام تحليل المسار لاستنتاج العلاقات السببية بين مجموعة من المتغيرات باستخدام المتغيرات ذات قيم معامل الارتباط، ولكن هدفنا هو تطبيق طريقة تحليل البيانات على نموذج سببي (Causal model) نفترضه على أساس نظري ما) فيساعد في تحديد كيفية تأثير العوامل على بعضها البعض، وكيفية تاثيرها

مجتمعة. ويمكن استخدام أسلوب تحليل المسار إذا تحققت الفرضيات بوجود علاقة بين المتغيرات او لايوجد ارتباط بين المتغيرات (المستقلة والتابعة) او وجود علاقة بين المتغيرات باتجاة واحد او عكسية في نموذج البناء . [12]

3-الرضا والولاء الوظيفي

يعتبر الرضا الوظيفي حالة ايجابية في العمل حيث يؤثر على كافة سلوكيات الموظفين تجاة وظائفهم على اعتبار الرضا الوظيفي يفي بتطلعات الموظفين عن وظائفهم من جهة وعنصر اساسي لنجاح المنظمة حيث يؤثر على ادائهم للعمل والابداع والتميز فهي تتصل بزيادة الانتاج والأرباح. فهو الحالة الذهنية أو شعور الفرد بالرضا فيما يتعلق بالعمل. وهذا ليس شكلاً من أشكال الرضا الذاتي أوالسعادة، ولكن الرضا عن عملهم هو بمثابة حافز لمواصلة العمل حيث تكون القدرة التنافسية وتناقص الأداء بين العمال مع انخفاض الترقيات والركود الوظيفي الرضا الوظيفي كلما ارتفع مستوى الأداء والإنتاجية في العمل . [13]

4-الالتزام الوظيفي

هو مدى ارتباط الموظف بالمنظمة واستعداده لبذل جهد لتحقيق اهدافها ويعد الالتزام مؤشرا مهما على عامل الرضا الوظيفي ويبين استعداده للبقاء في المنظمة والاهتمام السمتمر في تحسين بيئة العمل في المنظمة ويعبر الالتزام الى رغبة الفرد لتحقيق الأهداف و التفاعل من أجل تزويد المنظمات بالنشاط وديناميكية العمل والولاء فالالتزام متعدد الأبعاد للمنظمة والميل لتقييم المنظمة بشكل إيجابي ويتميز الالتزام بحالة غير ملموسة تتجسد في الولاء لمنظماتهم [14]

المبحث الثالث /الجانب التطبيقي

في هذا المبحث ستتم مناقشة النتائج باستخدام البرنامج SPSS/AMOS لمزاياة المتعدده في الاستخدام خاصة فيما يتعلق بثمثيل برنامج النموذج ،حيث قمنا بتفريغ استمارات الاستبيان الالكترونية وتحليلها لاعطاء نتائج الدراسة باستخدام البرنامج حيث تم استخدام التحليل الوصفي (استخدام التكرارات والوسط الحسابي والنسب المئوية والانحراف المعياري وحساب ثبات الاستبانة لمعرفة مستوى اجابة الافراد والتحقق من الجودة الكلية للاستبانة باستخدام معامل الثبات (طريقة فاكرونباخ) وكانت (0.805) للاستبانة ككل) وقامت الدراسة ببناء نموذج تحليل المسار باستخدام Amosمن خلال بناء نموذج سببي يوضح نمط العلاقات بين المتغيرات للدراسة للبيانات التي تم تصنيفها في الجانب النظري والتي تم الحصول عليها من خلال حساب مؤشرات تقييم الاداء، حيث تتكون عينة الدراسة من 150 تم الحصول عليها للكوادر العاملة في المستشيفات (مستشفى مدينة الطب).

المحور الاول :البيانات الشخصية تمثلت البيانات الشخصية على افراد العينة لمعرفة خصائصهم الفردية وقد جاءت على اربعة اسئلة الجنس والعمر والمستوى الدراسي وسنوات الخبرة وكما في الجداول ادناه:

جدول 02- يبين جنس والفئات العمرية والمستوى التعليمي وسنوات الخبرة لمجتمع الدراسة

البيانات	العدد الكلي لعينة البحث =150				
		التكرار	النسبة	M	Sd
الجنس	ذكر	81	%54	1.46	0.500
	انثى	69	%46		
العمر	31-21	6	%4	2.53	1.028
	41-31	94	%63		
	51-41	32	%21		
	61-51 فاكثر	18	%12		
التحصيل	اعدادية	6	%4	2.01	0.295
	بكلوريوس	137	%91		
	دراسات	7	%5		
الخبرة	10-4	31	%21	2.87	1.566
	16-10	57	%38		
	22-16	7	%5		
	28-22	11	%7		
	34-28 فاكثر	44	%29		

المحور الثاني : يحتوي على 14 فقرة لقياس متغيرات الدراسة باستخدام المقياس الخماسي لتقييم اداء الموظفين لتحديد درجات الموافقية على العبارات وكالاتي:

جدول 03- يبين المتوسطات الحسابية والانحراف المعياري لفقرات تقيم الاداء

	العبارة	لااوافق بشدة	لا اوافق	محايد	موافق	موافق بشدة	المتوسط الحسابي	الانحراف المعياري	ترتيب الفقرات
1	الانظمة والتعليمات واضحة ويستشار بها	3	66	23	46	12	2.99	1.074	8
2	يتم تقييم بمنطقية واضحة (بناء على اسس ومبادئ واضحة)	106	7	9	14	14	1.82	1.4	13
3	كفاءات المقيم تناسب موقعه	37	20	26	67	0	2.82	1.243	9
4	يتم اتصالك بالمسؤولين بسهولة	25	33	50	42	0	2.73	1.048	11
5	نظام االتقييم وافي ومرضي	104	16	13	6	11	1.69	1.231	14
6	تحرص المنظمة على المعاملة العادلة للتقييم	24	35	46	45	0	2.75	1.057	10
7	تمارس الادارة سياسة فريق واحد في تنظيم الامور	2	87	55	6	0	2.43	0.595	12
8	تتناسب الاسلوب الاداري مع ظروف العمل	8	37	42	62	1	3.07	0.949	7
9	تتصف القرارات الادارية بالمرونه والوضوح	5	16	64	64	1	3.37	0.680	2
10	الظروف البيئة مناسبة للتقييم في المستشفى	2	40	41	60	7	3.22	0.919	6
11	لا توجد اختلافات للاداء في المستشفيات عن المنظمات اخرى	8	16	13	110	3	3.70	0.712	1
12	معاملاتك تتم بالسرعة اللازمة وبتعاون تام	4	39	24	71	12	3.32	1.032	4
13	التحفيز الدائم في تقييم العمل متوفرة فتتمسك به	5	42	23	71	9	3.25	1.036	5
14	يمتاز المقيمون باجادة التقييم والحكم بعملك و طاقاتك وقدراتك والتطور المهني لك	5	30	25	84	6	3.37	0.959	3

يوضح الجدول (3) اجابة فقرات تقييم الاداء مرتبة حسب الاستبانة وتم ترقيم تلك الفقرات تصاعدياً كلما ارتفع قيمة الوسط الحسابي نجد أن الفقرة رقم (11) حصلت على أعلى معدل للوسط الحسابي ودرجة تقدير إجابات عينة الدراسة لهذه الفقرة مرتفعة، ما يعني أن لاتوجد اختلافات في تقييم أداء الموظفين في مستشفى الدراسة من وجهة نظر العاملين فيها مع نظيراتها تاتي بعدها الفقرة رقم (9و15) مما يعني على وصف القرارات الادارية بالمرونة والوضوح وبامتياز

المقيمون بأجادة التقييم في المنظمة وان الفقرات (5،2) والتي هي نظام االتقييم وافي ومرضي و يتم تقييم بمنطقية واضحة (بناء على اسس ومبادئ واضحة)، والتي تشير الى ضعف نظام التقييم وضعف الاسس والمبادئ وكونها غير واضحة .

المحور الثالث : يحتوي على 11 فقرات لقياس متغيرات دراسة للولاء والرضا الوظيفي للموظفين باستخدام المقياس الخماسي لتحديد درجات الموافقية على العبارات وكالاتي:

جدول 04- يبين المتوسطات الحسابية والانحراف المعياري لفقرات الولاء والرضا الوظيفي

	العبارة	لااوافق بشدة	لااوافق	محايد	موافق	موافق بشدة	المتوسط الحسابي	الانحراف المعياري	ترتيب الفقرة
1	**تفتخر كونك فردا من المؤسسة**	4	50	18	69	9	3.19	1.054	5
2	**تعمل في اختصاصك**	9	42	15	78	6	3.20	1.081	4
3	**مشاكل المستشفى مشاكلك**	21	42	19	61	7	3.15	1.083	6
4	**معايير اختيار القيادة الادارية واضحة**	11	35	17	82	5	2.94	1.200	10
5	**المعايير وتخصص الاداريين متكافئة**	11	35	17	82	5	3.23	1.077	3
6	**الكادر الوظيفي مناسب مع حجم العمل**	23	40	17	63	7	2.94	1.222	11
7	**مصداقية الادارة في تنفيذ المعايير**	28	34	20	63	5	2.8	1.234	9
8	**تتميز علاقتك مع مروؤسينك بالتفاهم**	14	32	14	84	5	3.24	1.074	2
9	**وجود فرص لتطوير الاداء الوظيفي**	21	28	16	80	5	3.13	1.121	7
10	**تم اشتراكك في اتخاذ قرارات خاصة بالعمل والتقييم**	18	47	39	33	13	3.11	1.130	8
11	**تتوفرالخدمات العامة لك (بيئة المستشفى المادية وتجهيز اثاث وانارة وكافة الوسائل لك)**	5	18	8	120	9	3.76	0.562	1

الجدول اعلاه يوضح المحور الثالث المتضمن الولاء والرضا الوظيفي الوسط الحسابي والانحراف المعياري وتكرارات الإجابات لافرادا العينةحيث حصلت الفقرة (11) على أعلى قيمة للمتوسط وكانت الفقرة " تتوفرالخدمات العامة لك(بيئة المستشفى المادية وتجهيز اثاث وانارة وكافة الوسائل لك) " وحصلت الفقرة(6) على اقل متوسط وهي (الكادر الوظيفي مناسب مع حجم العمل).

المحور الرابع: يحتوي على 11 فقرات لقياس متغيرات دراسة الالتزام الوظيفي للموظف بعملة في المنظمة باستخدام المقياس الخماسي لتحديد درجات الموافقية على العبارات وكالاتي

جدول 05- يبين المتوسطات الحسابية والانحراف المعياري لفقرات التزام الموظف في المنظمة

	العبارة	لااوافق بشدة	لااوافق	محايد	موافق	موافق بشدة	المتوسط الحسابي	الانحراف المعياري	الترتيب
1	اطلاعي تام بمعايير تقييم ادائي للعمل	17	25	40	54	14	3.13	1.157	2
2	القائم على عملية التقييم بجيدها	9	44	48	40	9	2.97	1.023	5
3	المعايير عادلة وموضوعية في العمل	7	17	35	72	19	3.53	1.008	1
4	معايير اختيارالقيادة الادارية واضحة	13	35	39	43	20	3.15	1.178	3
5	تقييم عملك يعتمد على جدارتك واستحقاقك	53	22	23	29	23	2.65	1.502	10
6	تشعر بالواجب تجاة منظمتك	25	39	51	26	9	2.77	1.122	7
7	تحافظ على اوقات العمل	50	17	35	24	24	2.70	1.473	8
8	قرار ارتباطك بالمنظمة صحيحا	37	33	40	26	14	2.63	1.280	11
9	رغبتك بالبقاء بالعمل	19	63	23	36	9	2.69	1.148	9
10	يتم تعديل تقييم عملك بعد التظلم وصحته	17	35	52	33	13	2.93	1.121	6
11	تتطلع للحصول على رتبة اعلى في المنظمة	22	30	54	31	13	2.98	1.156	4

في الجدول رقم (5) تبين أن أعلى فقرة التي حصلت على قيمة متوسط الحسابي هي(المعايير عادلة وموضوعية) فقد حصلت على (3.53) وانحراف معياري (1.008)1.29وما يشير الى معايير التقييم عادلة جهة الموظفين والفقرة (قرار ارتباطك بالمنظمة صحيحا) في الرتبة الاخيرة حيث بلغ متوسط الحسابي لها (2.63) وانحراف معياري (1.280) حيث تبين عدم شعروهم بالارتباط بالمنظمة قرار صحيح. ولغرض تحليل واختبار الدراسة، فقد تم اعتمادا بعض المؤشرات الإحصائية باستخدام الحزمة الإحصائية للعلوم الاجتماعية (SPSS/Amos) الجدول الاتي يبين الفرضيات:

جدول 06- يبين فرضيات النموذج

	الفرضيات المباشرة لنموذج الدراسة		التاثير	النسبة الحرجة CR	الدلالة الاحصائية P-value
	المتغير المستقل	المتغير التابع			
1	الولاء والرضاالوظيفي	تقييم الاداء	0.68	6.286	0.000
2	البيانات الشخصية	تقييم الاداء	0.36	2.487	0.000
3	تقييم الاداء	الولاء والرضا الوظيفي	0.31	2.248	0.000
4	تقييم الاداء	الالتزام الوظيفي	0.68	4.577	0.000
5	الالتزام الوظيفي	تقييم الاداء	0.02	0.231	0.98
6	تقييم الاداء	البيانات الشخصية	0.111	0.045	0.013

الاستنتاجات

1- اظهرت وجود علاقة بين تقييم الاداء والالتزام الوظيفي للكادر العامل في منظمة البحث
2- اظهرت وجود علاقة بين الولاء والرضا الوظيفي للعاملين عند حصولهم على تقييم اداء متميز فتقيم الاداء له دور متميز على العاملين
3- لاتوجد علاقة بين البيانات الشخصية وتقييم الاداء للعاملين فالكل متساوي لا يميز بين الخبرة وسنوات العمل ودورها للموظف .
4- اثبتت وجود علاقة بين تقييم الاداء وتاثيرة على الالتزام الفعال للموظفين حيث يعمل على تحسين الاداء والانتاجية في المنظمة
5- تساعد مؤشرات تقييم الأداء على تزويد المديرين على كافة المستويات بوسائل قياس وتخطيط الأداء مؤديا الى تمكينها من قرارات مقامة على حقائق موضوعية .
6- تمثل مؤشرا تقويم الاداء نوعا من الحوافز التي تشحذ همم التنظيم البشري للمنظمة والتي تعمل على تحفيز الطاقات الخلابه نحو اداء مبدع .
7- أظهرت النتائج أن هناك علاقة قوية بين القيادة الفعالة والرضا الوظيفي مما يعني ان الموظفين الاكثر رضا وظيفي يميلون الى تقديم افضل اداء.
8- تؤثر العوامل التنظيمية(بيئة العمل ،سياسة وقيادة المستشفى) في مستوى الرضا.

التوصيات

1- أسلوب تحليل المساريستخدم في مجالات لاهميتة الكبيرة في تفسير تباين المتغير التابع حيث تساعد هذه المؤشرات غلى اكتشاف الانحرافات وتحليلها والوقوف غلى اسبابها .
2- يؤثر الرضا الوظيفي إيجابيًا على الأداء، فيجب تحسين مهارات القيادة لدى المديرين وتطوير برامج تدريبية لتعزيز قدراتهم في إدارة الفرق في التقييم .
3- عند تقييم الاداء الاخذ بظروف العالمين في هذا الجانب لما يعانية من ضغط وظيفي .
4- تطوير وتحديث معايير تقيم الاداء خاصة بالجانب الصحي لطبيعة عملهم والاخذ بنظر الاعتبار سنوات الخبرة في العمل .
5- تنفيذ استبيانات دورية لقياس الرضا الوظيفي واجراء تحسينات مستمرة .
6- توفير برامج دعم لصحة النفسية خاصة في المجال الصحي ليقلل من الضغوط ويحسن من رضا الموظفين.
7- نقترح إجراء دراسات مشابهة في مجالات اخرى .

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Analysis of the flow peristaltic non-Newtonian fluid under the effect electric field and magnetic field through porous medium in asymmetric channel

Liqaa Zakie Hummad [1]

Abstract

In this research, it has been studied the electric and magnetic field with rotation and the concentration of heat transfer through the peristaltic flow of non-Newtonian fluid in an asymmetric channel with a porosity under long wavelength and low Reynolds number assumptions. All nonlinear partial differential equations are extracted using the perturbation method. The fluid is subject to electric, magnetic field and changes in concentration of the fluid. as it flows within a porous medium. we use graphs for the purpose of expressing the stream speed and pressure gradient and their effect on the parameters affecting the equations of motion by using the mathematics program MATHEMATICA. The effect of these parameters is discussed below and explained graphically through a set of numbers to obtain numerical results.

Keywords: Peristaltic flow; Electric field; MHD; Rotation; Heat transfer and Concentration

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1. Introduction.

Wave trains propagating alongside the channel partitions help to approximate the delivery of a fluid mechanism called peristaltic transport. This phenomenon has a number of practical uses in human structure and biomedical engineering, such as chyme motion inside the digestive system, food swallowing, blood drift inside the bile duct, lymph drive inside the lymphatic arteries, urine delivery through the ureter, and ovum transfer, etc. initially Latham [1] and Shapiro et al. Burns and Parkes [2]used two situations to analyze peristaltic transport; the first example uses the peristaltic flow without pressure gradient, while second involves flow down a channel, or tube under pressure, since Abdulhadi, [3] sadaf, [4] M.O. Kadhim, and L.Z. Hummady, [5] and Akram, [6] looked into the peristaltic transport process, which has drawn interest from many scholars. Moreover, non-Newtonian fluids are more widely used in industrial and physiological processes than viscous liquids. Powell-Eyring [7] is one of the non-Newtonian substances that is commonly found in nature, along with blood, paints, lubricants, ketchup, and shampoo. It is distinguished by its high polymer ionic solution. [8]

An applied magnetics field's (MHD) advantages for peristaltic effectiveness are critical when discussing the wave form motion of non-Newtonian fluids in porous channel, [9–12] Additionally, it aids in the treatment of gastroparesis, morbid obesity, and 66gnetic resonance imaging (MRI), which is a diagnostic tool for blood vessel, tumor, and brain diseases. A material with many tiny holes scattered across it is called a porous medium. Fluid infiltration is maintained in riverbeds by flows over porous media; significant examples of these fluxes include the passage of groundwater, oil, and water through porous materials. The majority of an oil reservoir is made up of home-trapped oil in limestone and sandstone rock formations. [13]. Examples of naturally porous medium include wood, rye bread, bread loaves, gallbladder sand, filters, and so on. Every procedure outlined above, including oxygenation and food processingBenefits from the mo include dialysis, tissue condition, radiation between the tissue's surface and surrounding environment, and heat convection for blood flow from the tissue's holes. Transfer of heat while the fluid peristaltically repositions [14 –16]. Examples of naturally porous medium include wood, rye bread, bread loaves, gallbladder sand, filters, and so on.

Every procedure outlined above, including oxygenation and food processingBenefits from the mo include dialysis, tissue condition, radiation between the tissue's surface and surrounding environment, and heat convection for blood flow from the tissue's holes. Transfer of heat while the fluid peristaltically repositions[17], While temperature increases the fluid's velocity, most of these investigations discovered that changes in concentration and the fluid's position inside

the channel cause the fluid's velocity to shift in an unexplained way, [18–20]. Because of its importance in several industrial and environmental applications, the study of electrokinetic processes in porous media has attracted a lot of attention. Specifically, studies of electroosmotic flow (EOF) in porous materials under the action of electric and rotational forces have become important subjects of study. Optimizing processes ranging from medicine delivery systems to oil recovery and water purification requires an understanding of the behavior of charged fluids, such as electrolytes, within porous materials [21-23]. The inquiry will cover the effects of concentration and temperature on the oscillating flow of magnetizing Eyring-Powell fluid hydrodynamics through a porous material. & Hatem studied the effects of mixed convection on heat transmission, viscous liquid in an asymmetric channel with respect to the peristaltic movement, [24]. Furthermore, he investigated the impact of rotational movement and the magnetic field on mixed convection analysis. the passage of a thick liquid fluid through a porous media thermal system and, in porous media, the effect of heat transfers on the peristaltic transport of the Powell-Eyring fluid in the presence of a magnetic field through an asymmetric channel [25]. The objective of this research is to examine the peristalsis in transport of Powell - Eying fluid when there is rotation, porous medium, magnetic and electric field.

2. Problem Formulation:

In a two-dimensional asymmetric channel, peristaltic motion is incompressible motion to a non-Newtonian fluid with width (d'+ d). What is the forward motion (c) that generates the flow of the infinite sinewave that passes along the channel wallsThe wall structure's geometric definition is:

$$\bar{h}_1(\bar{X},\bar{t}) = \acute{d} - \mathring{a}_1 \sin[2\dot{\pi}\,\lambda\,(\bar{x}-\bar{c}\bar{t})] \qquad \text{upper wall} \qquad (1)$$

$$\bar{h}_{\dot{2}}(\bar{X},\bar{t}) = -\acute{d}\,' - \mathring{a}_2 \sin[2\dot{\pi}\,\lambda\,(\bar{x}-\bar{c}\bar{t}) + \ddot{\phi}] \qquad \text{lower wall} \qquad (2)$$

we have $h_{\dot{1}}(\bar{x},\bar{t})$ it's lower and $h_{\dot{2}}(\bar{x},\bar{t})$ it's upper walls, respectively, where$(\acute{d},\dot{d}')$ represents the channel's width., $(\acute{\alpha}_1\,,\,\acute{\alpha}_2)$ waves are amplified, (λ) is wave length,(c) is the velocity of the wave, and (ϕ) the speed of the waves $(0 \le \phi \le \pi)$, then $\phi = 0$, is an out- of -phase channel that is symmetric, also $\phi = \pi$ waves are in phase, and of square-shaped coordinates is selected to that ($\bar{X}$ - axis) pointing in the wave's direction, and ($\bar{\gamma}$- axis) is perpendicular to $\bar{X}$, with $\bar{t}$ representing the time.

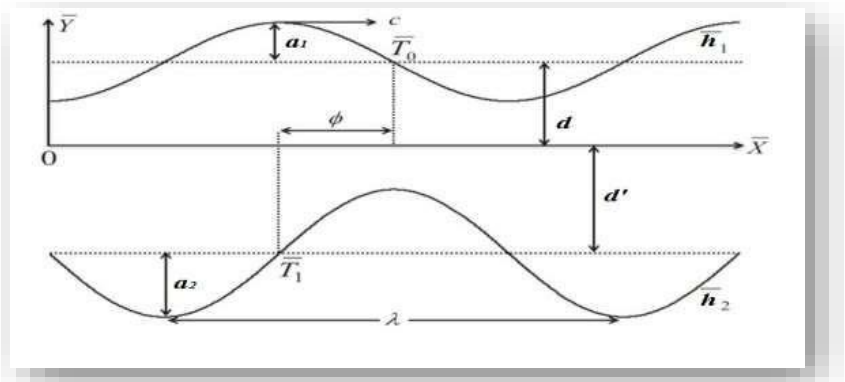

Figure 01- Channel coordinates in dimensional systems using cartesian asymmetry

Model of Powell-Eyring obedient fluid's tensor T of Cauchy stress below (Hayat, Aslam, et al., 2017).

$$\bar{\mathcal{L}} = -\dot{P}\,\mathrm{I} + \bar{\dot{S}} \tag{3}$$

$$\bar{\dot{S}} = [\,\mu + \frac{1}{\beta\dot{y}}\sinh_{\mathfrak{h}}^{-1}(\frac{\dot{\bar{Y}}}{C_1})]\,\mathbb{A}_{11} \tag{4}$$

$$\dot{\bar{Y}} = \sqrt{\frac{1}{2}\mathrm{tras}\,(\mathbb{A}_{11})^2} \tag{5}$$

$$\mathbb{A}_{11} = \nabla\bar{V} + (\nabla\bar{V})^{\mathrm{T}} \tag{6}$$

In the Powell - Eyring fluid, the material properties are represented by (β, C_1), the fluid pressure is denoted by p, the dynamic viscosity is (μ), the additional tension tensor is ($\bar{S}$) the identity tensor id (I), and the vector gradient is ∇ = (d$\bar{x}$, d$\bar{y}$, 0), the term sin ħ is roughly similar to.

$$\sin\hbar^{-1}(\frac{\bar{Y}}{c_1}) = \frac{\bar{Y}}{c_1} - \frac{\bar{Y}^3}{6{c_1}^3}, \quad |\frac{\bar{Y}^5}{6c_1^5}| \ll 1 \tag{7}$$

Three connected nonlinear momentum, energy, and continuity partial differentials expressed in a frame ($\bar{x}$, $\bar{y}$) control the flow.

$$\frac{d\bar{U}}{d\bar{X}} + \frac{d\bar{V}}{d\bar{Y}} = 0 \tag{8}$$

$$\rho\,(\frac{d\bar{U}}{d\bar{t}} + \bar{U}\frac{d\bar{U}}{d\bar{X}} + \bar{V}\frac{d\bar{U}}{d\bar{Y}}) - \rho\,\Omega\,(\,\Omega\bar{U} + 2\frac{d\bar{V}}{d\bar{t}}) = -\frac{d\bar{P}}{d\bar{X}} + \frac{d\bar{S}_{\bar{X}\bar{X}}}{d\bar{X}} + \frac{d\bar{S}_{\bar{X}\bar{Y}}}{d\bar{Y}} - \sigma\,B_0^2\,\bar{U} - \frac{\mu}{k}\,\bar{U} +$$

$$g\rho\,B_T(\,\dot{T} - \,\dot{T}_0) + g\rho B_c(\dot{C} - \dot{C}_0) \; + \bar{p}_c E_x \tag{9}$$

$$\rho\,(\frac{d\bar{V}}{d\bar{t}} + \bar{U}\frac{d\bar{V}}{d\bar{X}} + \bar{V}\frac{d\bar{V}}{d\bar{Y}}) - \rho\,\Omega\,(\Omega\bar{U} + 2\frac{dv}{d\bar{t}}) = -\frac{d\bar{P}}{d\bar{Y}} + \frac{d\bar{S}_{\bar{X}\bar{Y}}}{d\bar{X}} + \frac{d\bar{S}_{\bar{Y}\bar{Y}}}{d\bar{Y}} - \sigma\,B_0^2\bar{V} - \frac{\mu}{\bar{K}}\,\bar{V} + \bar{p}_c E_x$$

(10)

$$\rho c_p\left(\frac{c}{\lambda}\frac{d}{dt}+\frac{c}{\lambda}u\frac{d}{dx}+\frac{\delta c}{d}v\frac{d}{dy}\right)(T-T_0)=k\left(\frac{c^2}{\lambda^2}+\frac{d^2}{dt^{2.}}+\frac{1}{\lambda^{2}}\frac{d^2}{dx^{2.}}+\frac{1}{d^{2}}\frac{d^2}{dy^2}\right)(T-T_0)+\theta \quad (11)$$

$$\frac{dc}{dt}=D\frac{d^2c}{dy^2}+kr(c-c_0)+\frac{Dk_T d^2T}{T_m dy^2} \quad (12)$$

The famous poison equation

$$p_c=-\epsilon\nabla^2\bar{\emptyset} \quad (13)$$

$\bar{\emptyset}$ =electric potential

ϵ= dielectric paramititivty

Where (ρ) know the density of the liquid, $\bar{\mathcal{V}}$= ($\bar{U}$,$\bar{V}$) *v̇*elocity vector and ($\bar{P}$) is the hydrodynamic , $\bar{S}_{\overline{XX}}$, $\bar{S}_{\overline{XY}}$, and $\bar{S}_{\overline{YY}}$, the additional stress tensor's components $\bar{S}$, σ, is an electrical conductor. (B_0) is the magnetic field that remains constant, (β) represents the rotation, and is the magnetic field's inclination, (c_p) is specifically heated, ($\bar{k}$) is the capacity to conduct heat, (T) is the temperature,(ϵE_x) constant electric field, (μ) It represents viscosity, (θ) elements of Powell-Eyring additional stress tensor are listed below, according to definitions provided by Eq.(5)

$$\bar{S}_{\overline{XX}}=2\left(\mu+\frac{1}{\beta C_1}\right)\bar{U}_{\bar{x}}-\frac{1}{3\beta C_1^3}\left[2\bar{U}_{\bar{x}}^2+(\bar{U}_{\bar{y}}+\bar{V}_{\bar{x}})^2+2\bar{V}_{\bar{y}}^2\right]\bar{U}_{\bar{x}} \quad (14)$$

$$\bar{S}_{\overline{XY}}=\left(\mu+\frac{1}{\beta C_1}\right)(\bar{U}_{\bar{y}}+\bar{V}_{\bar{x}})-\frac{1}{6\beta C_1^3}\left[2\bar{U}_{\bar{x}}^2+(\bar{U}_{\bar{y}}+\bar{V}_{\bar{x}})^2+2\bar{V}_{\bar{y}}^2\right](\bar{U}_{\bar{y}}+\bar{V}_{\bar{x}}) \quad (15)$$

$$\bar{S}_{\overline{YY}}=2\left(\mu+\frac{1}{\beta C_1}\right)\bar{V}_{\bar{y}}-\frac{1}{\beta C_1^3}\left[\bar{U}_{\bar{x}}^2+(\bar{U}_{\bar{y}}+\bar{V}_{\bar{x}})^2+2\bar{V}_{\bar{y}}^2\right]\bar{V}_{\bar{y}} \quad (16)$$

While peristaltic motion in its natural state is unpredictable, it can be stabilized by applying the transformation from the laboratory framework ($\bar{X}$, $\bar{y}$), toward the wave frame ($\bar{x}$,$\bar{y}$).the changes that followed establish The connection between. pressure and coordinate velocities in the laboratory frame ($\bar{X}$, $\bar{Y}$) and the wave frame ($\bar{x}$, $\bar{y}$).

$$\bar{\mathcal{X}}=\bar{x}-c\bar{t}\,,\quad \bar{Y}=\bar{y}\,,\quad \bar{u}=\bar{U}-c,\quad \bar{V}=\bar{v}\quad ,\quad \bar{p}(\bar{x},\bar{y})=\bar{P}(\bar{X},\bar{Y},\bar{t}) \quad (17)$$

Wherever $\bar{U}$ and $\bar{V}$ indicate the speed $\bar{p}$ is a symbol for the pressure inside the wave frame. Now, well swap out equation (17) into formulas (1) (2) and (9-16) and add the non-dimensional variables to the final equation to normalize it.

$x = \frac{1}{\lambda}\bar{X}$, $y = \frac{1}{d}\bar{Y}$,$U = \frac{1}{c}\bar{U}$, $V = \frac{1}{\delta c}\bar{V}$, $p = \frac{d^2}{\lambda\mu c}\bar{p}$, $t = \frac{c}{\lambda}\bar{t}$, $h_1 = \frac{1}{d}\bar{h}_1$, $h_2 = \frac{1}{d}h_2$., $\delta = \frac{d}{\lambda}$, Re = $\frac{\rho cd}{\mu}$, Ha = $d\sqrt{\frac{\sigma}{\mu}}\beta_0$, Da = $\frac{k}{d^2}$, w = $\frac{1}{\mu\beta c_1}$, A = $\frac{w}{6}(\frac{c}{dc_1})^2$, $\ddot{T} = T - T_0$

$\theta = \frac{T-T_0}{T_1-T_0}$, $S_{xx} = \frac{\lambda}{\mu c}\bar{S}_{\bar{x}\bar{x}}$, $S_{xy} = \frac{d}{\mu c}\bar{S}_{\bar{x}\bar{y}}$, $S_{yy} = \frac{d}{\mu c}\bar{S}_{\bar{y}\bar{y}}$, Uhs=$\frac{-E_x \epsilon\varepsilon}{\mu_0 c}$,

Gr = $\frac{\rho g B_T d^2(T - T_0)}{Mc}$, Gc = $\frac{\rho g B_c d^2(c - c_0)}{\mu c}$, $\emptyset = \frac{(c - c_0)}{(c - c_0)}$, $\theta = \frac{(T - T_0)}{(T_1 - T_0)}$, Sc = $\frac{dc}{D}$,

Sr = $\frac{Dk_T(T_1 - T_0)}{CT_m\, d(C_1 - C_0)}$ (18)

Where non-dimensional lower and upper wall surfaces are denoted by (h_1) and (h_2) respectively, and (δ)is the wave number. the variables that represent the composition of the system are (Re)for Reynolds number, (Ha)for Hartman number,($\emptyset$) for ratio of amplitude,(w) the Darcy number (Da) and the Powell-Eyring fluid (A) represent the porous material's non-dimensional permeability media, respectively. (T_0) and (T_1) for temperatures at both are top or bottom, (Gr) is thermal Grashof number, and (Gc) for solutes Grashof number, (Sc) represents the Schmidt number,(Sr) and is the amount of sores,(θ) dimensionless temperature.

Then in view of Eq. (18) and Eq. (1), (2), and (9) - (13) Obtain the following.

Form Equation (1) now takes.

$h_i(x, t) = 1 - \bar{\alpha}\sin(2\pi x)$ (19)

$h_2(x, t) = -d^* - b\sin(2\pi x + \ddot{\emptyset})$ (20)

then, we have [$\bar{\alpha}$, b, d* also $\emptyset$] substitute it into equation (3)

$\bar{\alpha}^2 + b^2 + 2\bar{\alpha}b\cos\phi \le (1 + d^*)^2$ (21)

$\frac{du}{dx} + \frac{dv}{dy} = 0$ (22)

$Re\ \delta(\frac{du}{dt} + u\frac{du}{dx} + v\frac{du}{dy}) - \frac{\rho d^2\Omega}{\mu}(\Omega u + 2\frac{\delta c}{\lambda}\frac{dv}{dt}) = -\frac{dp}{dx} + \delta^2\frac{d}{dx}S_{xx} + \frac{d}{dy}S_{xy} - H\ \bar{\alpha}^2 u - \frac{1}{Da}u +$ Gr θ +Gc $\emptyset$ + Uhs $\left(\delta^2\frac{\partial^2 £}{\partial x^2} + \frac{\partial^2 £}{\partial y^2}\right)$ (23)

$Re\delta^3(\frac{dv}{dt} + u\frac{dv}{dx} + v\frac{dv}{dy}) - \frac{\rho d^2\Omega\delta}{\mu}(\Omega v + 2\frac{\delta c}{\lambda}\frac{dv}{dt}) = -\frac{dp}{dy} + \delta^2\frac{ds_{xy}}{dx} + \delta\frac{ds_{yy}}{dy} + Ha^2 v\delta + Uhs\left(\delta^2\frac{\partial^2 £}{\partial x^2} + \frac{\partial^2 £}{\partial y^2}\right) - \frac{\delta^2}{Da}v$ (24)

$$Re\,\rho r\,\delta\left(\frac{d}{dt}+\delta u\,\frac{d}{dx}-\delta v\frac{d}{dy}\right)\theta=\left(\delta^2\frac{c^2d^2}{dt^2}+\delta^2\,\frac{d^2}{dx^2}+\frac{d^2}{dy^2}\right)+\mathrm{B} \quad (25)$$

$$\rho c_p\delta\left(\frac{d}{dt}+u\,\frac{d}{dx}+v\,\frac{d}{dy}\right)\left(\frac{(c-c_0)}{(c_1-c_0)}\right)=\frac{d}{c}\,\frac{D}{(c-c_0)}\,\frac{d^2c}{dy^2}-\mathrm{kr}\,\frac{(c-c_0)}{(c-c_0)}+\frac{d}{c}\,\frac{Dk_Td^2T}{(C-C_0)T_mdy^2} \quad (26)$$

$$S_{xx}=2(1+\mathrm{w})\frac{du}{dx}-2\mathrm{A}\,[2\delta^2(\frac{du}{dx})^2+(\frac{du}{dy}+\delta^2(\frac{dv}{dx})^2+2\delta^2(\frac{dv}{dy})^2]\frac{du}{dx} \quad (27)$$

$$S_{xy}=(1+\mathrm{w})(\delta^2\frac{dv}{dx}+\frac{du}{dy})-\mathrm{A}[2\delta^2\cdot(\frac{du}{dx})^2+(\frac{du}{dy}+\delta^2\frac{dv}{dx})^2+2\delta^2(\frac{dv}{dy})^2](\delta^2\frac{dv}{dx}+\frac{du}{dx}) \quad (28)$$

$$S_{yy}=2(1+\mathrm{w})\,\delta\frac{dv}{dy}-2\mathrm{A}\delta\,[2\delta^2(\frac{du}{dx})^2+(\frac{du}{dy}+\delta^2\frac{dv}{dx})^2+2\delta^2(\frac{dv}{dy})^2]\frac{dv}{dy} \quad (29)$$

we note the relation between, The function of the stream, (ψ), and the velocity component:

$$\mathrm{u}=\frac{\mathrm{d}\Psi}{\mathrm{dy}}\ .\ \mathrm{v}=-\frac{\mathrm{d}\Psi}{\mathrm{dx}} \quad (30)$$

we will substitute Equation (30), inside the equation (23)- (29), keeping in mind that the mass balance shown by aqua,(22), is also satisfied, which results in the satisfaction of equation (30)

$$Re\delta\left(-\frac{\mathrm{d}^2\Psi}{\mathrm{dtdy}}+\frac{\mathrm{d}^3\Psi}{\mathrm{dxdy}^2}-\frac{\mathrm{d}^3\Psi}{\mathrm{dxdy}^2}\right)-\frac{\rho d^2\Omega}{\mu}\left(\Omega\,\frac{\mathrm{d}\Psi}{\mathrm{dy}}-2\frac{\delta c}{\lambda}\,\frac{\mathrm{d}^2\Psi}{\mathrm{dtdx}}\right)=-\frac{\mathrm{dp}}{\mathrm{dx}}+\delta^2\,\frac{\mathrm{d}}{\mathrm{dx}}\,\mathrm{S_{xx}}+\frac{\mathrm{d}}{\mathrm{dy}}\,\mathrm{S_{xy}}-\mathrm{Ha}^2\frac{\mathrm{d}\Psi}{\mathrm{dy}}-\frac{1}{\mathrm{Da}}\frac{d\Psi}{\mathrm{dy}}+\mathrm{Gr}\,\theta+\mathrm{Gc}\,\emptyset+\mathrm{Uhs}\left(\delta^2\frac{\partial^2\pounds}{\partial\mathrm{x}^2}+\frac{\partial^2\pounds}{\partial\mathrm{y}^2}\right) \quad (31)$$

$$Re\,\delta^3\left(\frac{\mathrm{d}^2\Psi}{\mathrm{dtdx}}+\frac{\mathrm{d}^3\Psi}{\mathrm{dx}^2\mathrm{dy}}+\frac{\mathrm{d}^3\Psi}{\mathrm{dx}^2\mathrm{dy}}\right)-\frac{\delta\rho\Omega d^2}{\mu}\left(\Omega\frac{\mathrm{d}\Psi}{\mathrm{dx}}-2\frac{\delta c}{\lambda}\,\frac{\mathrm{d}^2\Psi}{\mathrm{dtdx}}\right)=\frac{d\mathrm{p}}{\mathrm{dy}}+\delta^2\,\frac{\mathrm{ds_{xy}}}{\mathrm{dx}}+\delta\frac{\mathrm{ds_{yy}}}{\mathrm{dy}}+\mathrm{Ha}^2\frac{\mathrm{d}\Psi}{\mathrm{dx}}\delta+\delta^2\frac{1}{\mathrm{Da}}\frac{\mathrm{d}\Psi}{\mathrm{dx}}+\mathrm{Uhs}\left(\delta^2\frac{\partial^2\pounds}{\partial\mathrm{x}^2}+\frac{\partial^2\pounds}{\partial\mathrm{y}^2}\right) \quad (32)$$

$$Re\rho r\,\delta\left(\frac{d}{dt}+\Psi_y\,\frac{d}{dx}-\Psi_x\frac{d}{dy}\right)\theta=\left(\delta^2\frac{c^2d^2}{dt^2}+\delta^2\,\frac{d^2}{dx^2}+\frac{d^2}{dy^2}\right)\theta+\mathrm{B} \quad (33)$$

$$\rho c_p\delta\left(\frac{d}{dt}+\Psi_Y\,\frac{d}{dx}-\Psi_X\,\frac{d}{dy}\right)\left(\frac{(c-c_0)}{(c_1-c_0)}\right)=\frac{d}{c}\,\frac{D}{(c-c_0)}\,\frac{d^2c}{dy^2}\,\mathrm{kr}\,\frac{(c-c_0)}{(c-c_0)}+\frac{d}{c}\,\frac{Dk_Td^2T}{(C-C_0)T_mdy^2} \quad (34)$$

$$S_{xx}=2\,(1+\mathrm{w})\frac{d^2\Psi}{dxdy}-2\mathrm{A}[2\delta^2(\frac{d^2\Psi}{dxdy})^2+(\frac{d^2\Psi}{dy^2}-\delta^2\frac{d^2\Psi}{dx^2})^2+2\delta^2(-\frac{d^2\Psi}{dxdy})^2](\frac{d^2\Psi}{dxdy}) \quad (35)$$

$$S_{xy}=(1+\mathrm{w})(-\delta^2\frac{d^2\Psi}{dx^2}\frac{d^2\Psi}{dy^2}-\mathrm{A}[2\delta^2(\frac{d^2\Psi}{dxdy})^2+(\delta^2\frac{d^2\Psi}{dx^2}+\delta^2\frac{d\Psi}{dy^2})^2+2\delta^2(\frac{d^2\Psi}{dxdy})^2]$$

$$(\delta^2\frac{d^2\Psi}{dx^2}\,\frac{d^2\Psi}{dy^2}) \quad (36)$$

$$S_{yy}= -2(1+ w)\,\delta \frac{d^2\Psi}{dxd} - 2A\delta\,[2\delta^2(\frac{d^2\Psi}{dxdy})^2 + (\frac{d^2\Psi}{dy^2} - \delta^2 \frac{d^2\Psi}{dx^2})^2 + 2\delta^2(\frac{d^2\Psi}{dxdy})^2]$$

$$\left(-\frac{d^2\Psi}{dxdy}\right) \qquad (37)$$

the formulas from (31) to (36) is form ($Re\ and\ \delta \ll 1$) are present:

$$0 = -\frac{dP}{dx} + \frac{dS_{xy}}{dy} - (\mathrm{H}a^2 + \frac{1}{Da})\,\varphi_y + G_r\theta + G_c\emptyset + Uhs£_{yy} \qquad (38)$$

$$£(y) = \frac{\sinh(y+h)\,k}{\sinh(2hk)}$$

$$-\frac{dp}{dy} = 0 \qquad (39)$$

while the additional stress tensor's component takes on the shape of

$$S_{XX} = 2\,(1+w)\frac{d^2\Psi}{dxdy} - 2A\,(\frac{d^2\Psi}{dy^2})\frac{d^2\Psi}{dxdy} \qquad (40)$$

$$S_{XY} = (1 + w\,)(\frac{d^2\Psi}{dy^2}) - A\,(\frac{d^2\Psi}{dy^2})^3 \qquad (41)$$

$$S_{yy} = 0 \qquad (42)$$

The following equation is found if equation (41) is substituted into equation (38) and the derivation using respect to y via (w + 1) calculated:

$$\frac{d^4\Psi}{dy^4} - \dot{\eta}\,A\,\frac{d^2}{dy^2}(\frac{d^2\Psi}{dy^2})^3 - \zeta\,\frac{d\Psi}{dy} + \dot{\eta}\,Gr\,\theta + \dot{\eta}\,G\,c\,\emptyset + Uhs\,£_{yyy} = 0 \qquad (43)$$

When,

$$\boldsymbol{\zeta} = \frac{Ha^2 + \frac{1}{Da} - \frac{\rho d^2 \Omega^2}{\mu}}{w+1} \quad , \quad \boldsymbol{\dot{\eta}} = \frac{1}{w+1}$$

the dimensionless volume flow rate and boundary condition in the wave frame are as follows:

$$\Psi = \frac{F}{2} \quad , \quad \frac{d\Psi}{dy} = -1 \quad , \quad \theta = 0\,, \quad \text{at} \quad \dot{\gamma} = \mathrm{h}_1 \qquad (44)$$

$$\Psi = -\frac{F}{2} \quad , \quad \frac{d\Psi}{dy} = -1 \quad , \quad \theta = 0\,, \quad \text{at} \quad \dot{\gamma} = \mathrm{h}_2 \qquad (45)$$

The dimensionless temporal average in the wave frame is denoted by $\dot{F}$.

3. The ṗroblem's Solution:

through increasing in flow rates in a power series A, the perturbation method is utilized to solve a non-linear partial differential equation system.

$$\Psi = \Psi_0 + A\,\Psi_1 + 0\,(A^2) \quad (46)$$

$$\dot{p} = p_0 + A\,p_1 + 0\,(A^2) \quad (47)$$

we replace equations (48) and (49), in equations (38) to (45) and also the boundary condition (48) and (49), and compare the same force's coefficients A until the initial degree, we obtain the solutions of the system below:

3.1. Zeroth Ǿrder System:

If the order's conditions are Rn, which are insignificant in the zeroth order system we get:

$$\Psi_{0yyyy} - \zeta\,\Psi_{0yy} + \text{Uhs}\,\emptyset_{yyy} = 0 \quad (48)$$

Then,

$$\Psi_0 = \frac{F_0}{2}, \quad \frac{d\Psi_0}{dy} = -1, \quad \text{at} \quad \dot{\gamma} = \text{h}_1 \quad (49)$$

$$\Psi_0 = -\frac{F_0}{2}, \quad \frac{d\Psi_0}{dy} = -1, \quad \text{at} \quad \dot{\gamma} = \text{h}_2 \quad (50)$$

3.2. *F*irst Ǿrder System:

$$\Psi_{1yyy} - \frac{d^2}{dy^2}(\Psi_{0yy})^3 - \zeta\,\Psi_{1yy} + \text{Uhs}\,£_{yyy} = 0 \quad (51)$$

$$\Psi_1 = \frac{F_1}{2}, \quad \frac{d\Psi_1}{dy} = 0, \quad \text{at} \quad \dot{\gamma} = \text{h}_1 \quad (52)$$

$$\Psi_1 = \frac{F_1}{2}, \quad \frac{d\Psi_1}{dy} = 0, \quad \text{at} \quad \dot{\gamma} = \text{h}_2 \quad (53)$$

You can obtain the last equation for by resolving the zero-order as well as first-order system the function of the stream.

$$\Psi = \Psi_0 + A\Psi_1 \quad (54)$$

the following is the formula for the axial velocity component:

$$u(x, y, t) = \Psi_y$$

now equation (45) became:

$$\frac{dp}{dx} = \Psi 0yyy - \zeta\Psi 0y + A\Psi 1yyy - \frac{d}{dy}(\Psi 0yy)3 - A\zeta\Psi 1y + \text{Gr}\,\theta + \text{Gc}\,\emptyset + Uhs£_{yy}$$

4. Results

In this section looked at two a chess velocity distribution is covered in the first section and the, (MATHEMATICA)program was used to study the pressure gradient in the second section

4.1. Velocity ḍistribution(u)

To changing values of u it reflects the variation the channel's axial velocity across is varied. the effect of different values (Ha, Da, β, Ω, w, d, ϕ, A, kr, B, Gc, Gr, Sc, Sr, Uhs, b) the axial velocity u is seen in Fig. (2) to (15)**,** the axial velocity a straight channel depends on several factors, including the flow rate determined by the fluid continuity equation and the boundary conditions for flow within the channel.

a) Figures (2), (3), (4), (6), (7) show that the axial velocity increases with the increase of the Hartmann number (Ha), it is material fluid parameter (β), it the Darcy number (Da) also values its parameter (w), its parameter values (ϕ) are the central region of the channel, while it is decreases in the region of the side walls to channel.
b) Figures (5), (8), (9), (10), (11), (12), (13), (14), (15) showed that the axial velocity decreases in the middle. For each these values, rotation (Ω), material fluid parameters [(B), (k r), (G c), (Gr), (S c), (S r), and channel width (D)] are selected. at the walls, the axial velocity falls. the wall.

4.2. Ṗressure ġradient ($\frac{\dot{d}p}{\dot{d}x}$):

The impact of the pertinent pressure gradient parameters (d$\dot{p}$/dx) will be visually depicted in Figures [(16) - (29)]:

a) In Figures (16), (18), (19), (21), (22), (23), (24), (25), (26), (27), (28), (29) that Increase in values of Hartmann number (Ha), and Darcy number(Da), rotation (Ω) amplitude ratio (ϕ), parameter for material fluid (A), and parameters [(B), (kr), (Gc) (Gr), (Sc), (Sr), channel width (d)] and vector amplitude (a) indicate the axial pressure gradient that rises in the middle toward top of the curve, but has no change in the axial pressure gradient in the vicinity left or right of channel.

b) In figures (17) and (20), increasing the slope of the magnetic (β) and the fluid parameter (w) result in an axial pressure gradient that diminishes as the peak to the curve shifts to there is no effect on the axial pressure gradient. near the right or left walls of the channel.

5. Conclusions:

This section will look at the spinning effects of the Powell-Eyring fluid peristaltic flow in a conduit that is a porous medium and is simultaneously affected by a ctilinear MHD magnetic field. created by selecting low Reynolds number peristaltic waves with varying amplitudes and phases over uneven walls. Then, using the turbulence approach—where the axial velocity and pressure gradient formulas are given—we examine the parameters using a number of graphs. This work investigates the effects of rotation on the peristaltic transport of a Powell-Eyring fluid in a symmetric channel during fluid movement in a porous medium that is susceptible to both the MHD magnetic field and the unified effects of fluid movement. It is believed that this field of research is concerned with. The effect of the magnetic field on liquids.

a) the axial velocity rises with increasing Hartman number (Ha), magnetic inclination (β) Darcy number values (Da), fluid coefficient values (w), and amplitude ratio (ϕ) increases in the central region drops in the channel's area while region of side walls of the channel.
b) It is observed that the channel's midsection experiences a drop in axial velocity for all values of rotation (Ω), thermal Grashof number (Gr), solute Grashof number (Gc) material fluid parameter (A), parameter (B), and Schmidt number (Sc), the axial velocity unchanged grows gradually until it approaches the channel walls' boundaries leaving the sore(Sr)and channel width (d) in place.
c) when The magnetic field's inclination (β) and the fluid parameter (w) increase. leads to a decrease in the axial pressure in the middle region of the channel. while. the axial pressure gradient remains unaffected along the left and right channels.
d) inside fluid parameter for the material(A), this parameters (B), (kr), (Gc), (Gr), (Sc) (Sr) and channel width (d) and vector amplitude (a) indicates the axial pressure gradient that rises in the middle and moves the channel curve upward but it has no influence concerning the axial pressure gradient that is on left or right the channel.

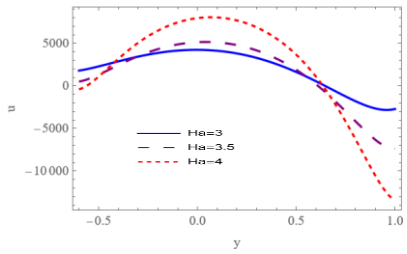

Figure 02- variation of u with respect to (Ha) values when Ha=3,A=5 B=0.1 β=0.1,Da=6,Ω=0.3,w=0.3,ϕ=0.5,kr= 0.5,Gc=0.8,Gr=1.8,Sc=0.8,Sr=1.8.

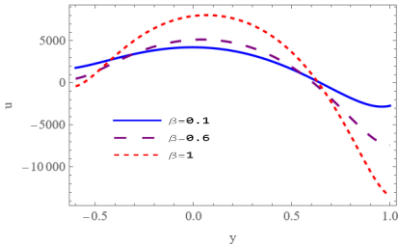

Figure 03- variation of u with respect to(β) values when Ha=3,A=5 B=0.1, β=0.1,Da=6,Ω=0.3,w=0.3,ϕ=0,kr=0 .5,Gc=0.8,Gr=1.8,Sc=0.8,Sr=1.8.

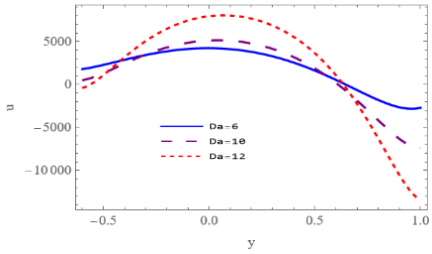

Figure 04- Variation of u with respect to (Da) values when Ha = 3,A = 5 β=0.1, Da=6, Ω=0.3, w=0.3,B=0.1, kr=0.5, Ø=0.5, Gc=0.8, Gr=1.8, Sc=0.8,Sr=1.8.

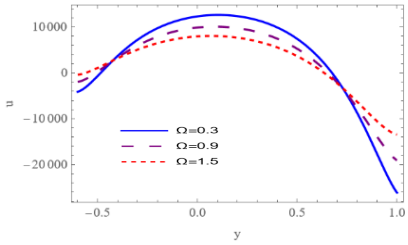

Figure 05- variation of u with respect to(Ω)values when Ha=3,A=5 kr=0.5,B=0.1,w=0.3,Da=6,Ø=0.5,Gc=0.8,β =0.1,Ω=0.3,Gr=1.8,Sc=0.8,Sr=1.8.

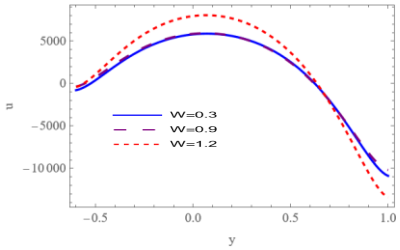

Figure 06-variation of u with respect to (w) values when Ha=3, β=0.1, Da=6,Ω=0.3, w=0.3,ϕ=0.5, A=5, kr=0.5, B=0.1,Gc=0.8, Gr=1.8 , Sc=0.8 , S r=1.8.

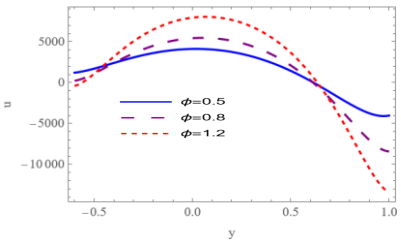

Figure 07- variation of u with respect to (ϕ) values when Ha=3,A=5 β=0.1,Da=6,Ω=0.3,w=0.3, Ø=0.5,B=0. 1,kr=0.5,Gc=0.8,Gr=1.8,Sc=0.8,Sr=1.8

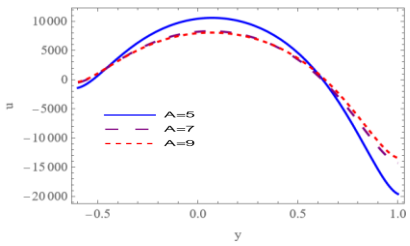

Figure 08- variation of u with respect to (A) values when Ha=3,w=0.3 β=0.1,Da=6,Ω=0.3,ϕ=0.5,A=5,kr=0.5,B=0. 1,Gc=0.8, Gr=1.8, Sc=0.8, Sr=1.8.

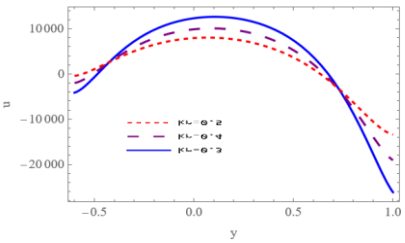

Figure 09- variation of u with respect to (kr)values when Ha=3,A=5 β=0.1,Da=6,Ω=0.3,w=0.3,ϕ=0.5,kr=0.5B= 0.1,Gc=0.8,Gr=1.8,Sc=0.8,Sr=1.8,

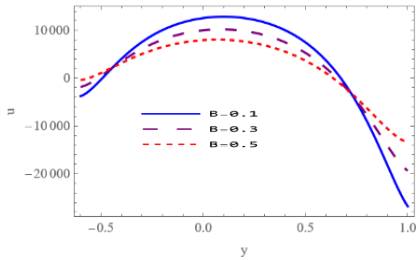

Figure 10- variation of u with respect to (B) values when Ha=3, β=0.1 Da=6, Ω=0.3,w=0.3, ϕ =0.5,A=5kr=0.5 B=0.1,Gc=0.8 , Gr=1.8, Sc=0.8,Sr=1.8.

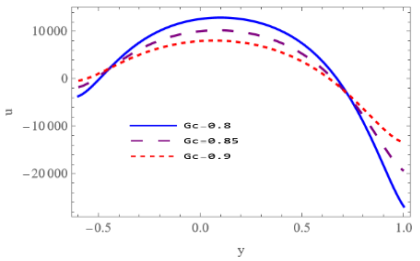

Figure 11- variation of u with respect to(Gc)values when Ha=3,A=5 β=0.1,Da=6,Ω=0.3,w=0.3,Ø=0.5,kr=0.5B= 0.1,Gc=0.8,Gr=1.8,Sc=0.8,S r=1.8.

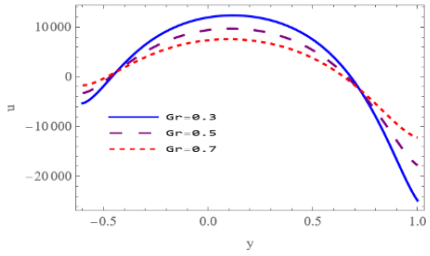

Figure 12- variation of u with Gr) values when respect to Ha=3,A=5, β=0.1,Da=6,Ω=0.3,w=0.3,B=0.1,Ø=0.5kr= 0.5, Gc=0.8,Gr=1.8,Sc=1.8,Sr=1.8.

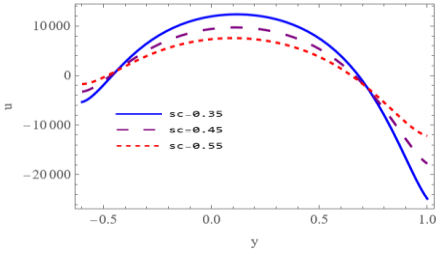

Figure 13- variation of u with respect to (Sc)values when Ha=3,β=0.1 Da=6, Ω= 0.3,w=0.3,ϕ =0.5,A=5,B=0.1 Kr=0.5,Gc=0.8,Gr=1.8, Sc=0.8, Sr=1.8

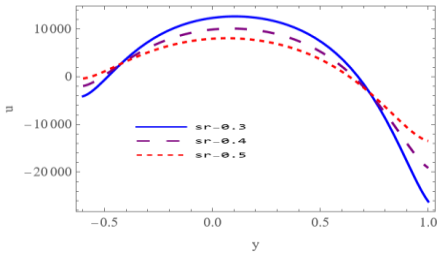

Figure 14- variation of u with respect to (Sr)values when Ha=3,A=5 β=0.1,Da=6,Ω=0.3,w=0.3,ϕ=0.5,kr=0.5B= 0.1,G c=0.8 ,Gr=1.8,Sc=0.8,Sr=1.8

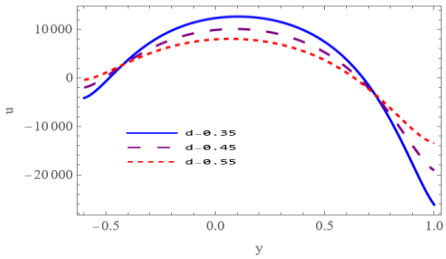

Figure 15- variation of u with respect to(d) values when Ha=3,A=5,w =0.3,Sc=0.8, β=0.1,Da=6,Ω=0.3,Ø = 0 .5,kr=0.5,B=0.1,Gc=0.8,Gr=1.8,Sr=1.8.

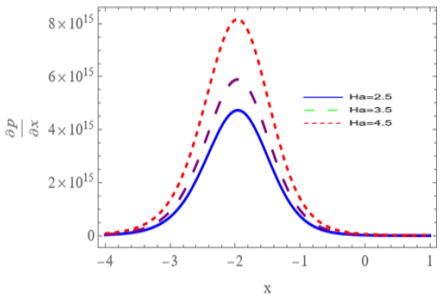

Figure16- variation in $(\frac{dp}{dx})$ for various values of (Ha) when B=0.1 w=0.3,A=5,Da=6,β=0.1,Ω=0.3, ϕ=0.5 kr=0.5,Gc=0.8,Gr=1.8,Sc=0.8,Sr=1.8.

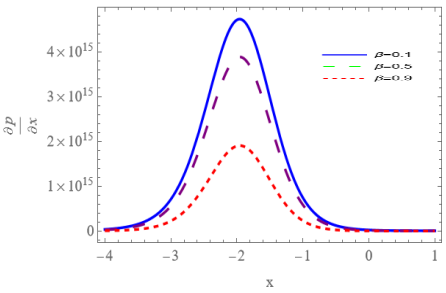

Figure17- variation in $(\frac{dp}{dx})$ for various values of(β)when Ha=3 A=5,Da=6, Ω=0.3,w=0.3, ϕ=0.5,kr=0.5, B=0.1,Gc=0.8, Gr=1.8 , Sc=0.8, Sr=1.8.

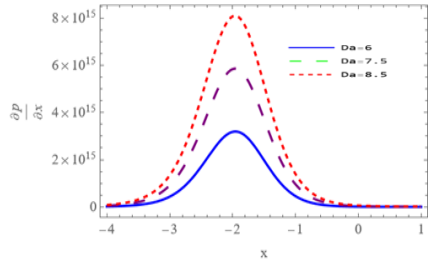

Figure18- variation in $(\frac{\dot{dp}}{\dot{dx}})$ for various values of (Da) when Ha=3, β=0.1,Ω=0.3,w=0.3,∅=0.5, A=5,B=0.1 kr=0.5, Gc=0.8 ,Gr=1.8,Sc=0.8, Sr=1.8.

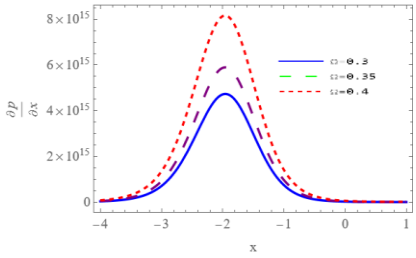

Figure19- variation in $(\frac{\dot{dp}}{\dot{dx}})$ for various values (Ω)when Ha=3, β =0.1,Da=6,w=0.3,ϕ=0.5,A=5,B=0.1 kr=0.5,Gc=0.8,Gr=1.8,Sc=0.8,Sr=1.8.

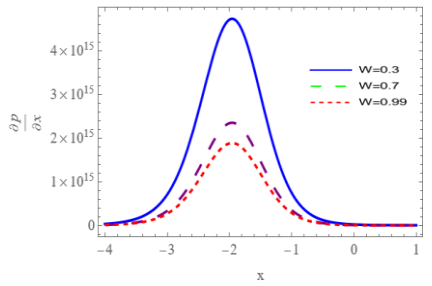

Figure 20- variation in $(\frac{\dot{dp}}{\dot{dx}})$ for various values of (w) when Ha=3 β=0.1,Da=6,Ω=0.3,ϕ=0.5,A=5,Kr=0.5 B=0.1,Gc=0.8 ,Gr=1.8, Sc=0.8, S r=1.8.

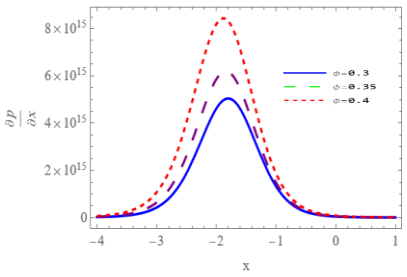

Figure 21- variation in $(\frac{\dot{dp}}{\dot{dx}})$ for various values of(∅)when Ha=3 β=0.1,Da=6, Ω=0.3, w=0.3,A=5,B=0. 1,kr=0.5,Gc=0.8,Gr=1.8,Sc=0.8,Sr=1.8.

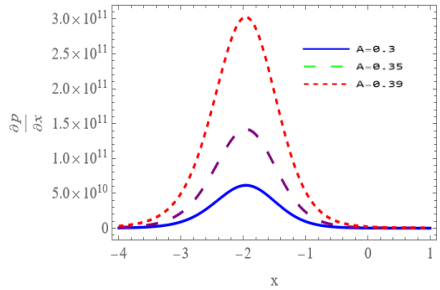

Figure 22- variation in $(\frac{\dot{dp}}{\dot{dx}})$ for various values of(A) when B=0.1 A=5,Ha=3,Da=6, β=0.1,kr=0.5,Gc=0.8,Gr= 1.8,Ω=0.3,ϕ =0.5,Sc=0.8,Sr=1.8.

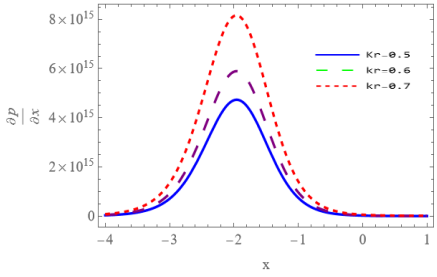

Figure 23- variation in $(\frac{\dot{dp}}{\dot{dx}})$ for various values of (kr) when Ha=3 A=5,β=0.1,Da=6,Ω=0.3,ϕ=0.5,B=0.1 kr=0.5,Gc=0.8,Gr=1.8,Sc=0.8,Sr=1.8.

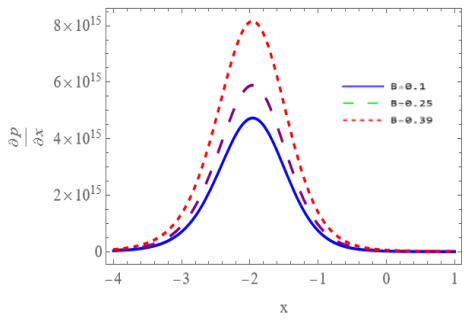

Figure 24- variation in $(\frac{dp}{dx})$for various values of Ha=3,A=5 B=0.1 β=0.1,Da=6,Ω=0.3,kr=0.5,ϕ=0.5,w= 0.3,Gc=0.8,Sc=0.8, Gr=1.8, Sr=1.8.

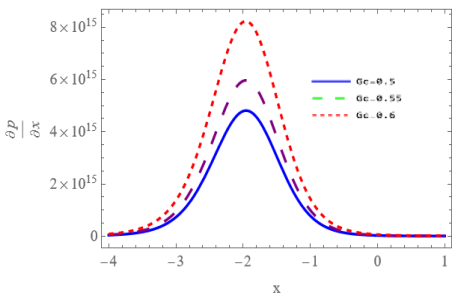

Figure 25- variation in $(\frac{dp}{dx})$ for various values of (Gc) when Ha=3 β=0.1,Da=6, Ω=0.3,w=0.3,A=5,B=0.1 Ø=0.5,kr=0.5,Gr=1.8,Sc=0.8,Sr=1.8.

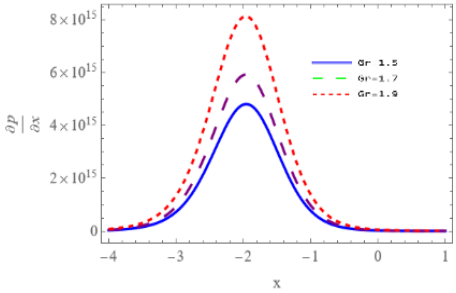

Figure 26- variatioin $(\frac{dp}{dx})$ for various values of(Gr) when Ha=3, Da=6,β=0.1,Ω=0.3,w=0.3,Ø=0.5,A=5 kr=0.5, B=0.1, Gc=0.8, Sc=0.8, Sr=1.8.

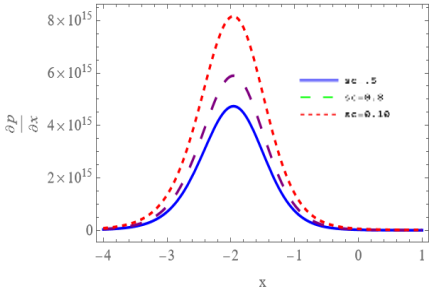

Figure 27- variation in $(\frac{dp}{dx})$ for various values of (Sc) when Ha=3 β=0.1,Da=6, Ω=0.3,w=0.3 Ø=0.5,A=5, kr=0.5,B=0.1,Gc=0.8, Gr=1.8 , Sr=1.8.

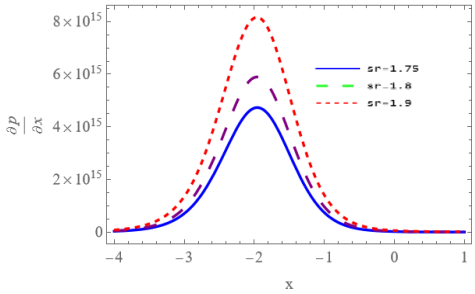

Figure 28- variation in $(\frac{dp}{dx})$ for various values of(Sr)when Ha=3,A= 5,B=0.1,β=0.1,w=0.3,Da=6,kr=0.5,Gc=0.8, Ω=0.3,ϕ=0.5,Gr=1.8,Sc=1.8,Sr=1.8.

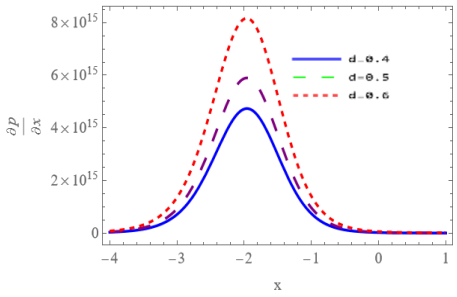

Figure29 - variation in $(\frac{dp}{dx})$ for various values of (d)when Ha=3,A= 5,β=0.1,Da=6,Ω=0.3,w=0.3,ϕ=0.5,kr=0.5B= 0.1,Gc=0.8,Gr=1.8, Sc=0.8, S=1.8.

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Yang Transformation for Solving Ordinary Differential Equations

Maha Saha. Al Ibrahimi [1], Zainab Mohammad Ridha Hadi [2]

Abstract

In this paper we applied a new integral transformation Yang transformation.

We found general formulas of solution for the ordinary differential equation and we applied these formulas in some example.

Keywords: Transformations; New Integral Transform; Solving Ordinary Differential Equations

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1. Introduction.

Transformations have been effectively utilized for very nearly two centuries in taclinghumerous issues in applied math, math physics, and engineering sciences.

Historically, the beginning of the vital transforms in cluding the Laplace and Fourier transforms can be followed back to commended work of p.s. Laplace (1749- 1827) on likelinood speculation during the 1780s and tmon- umentat sythesis of jeseph fourier (1768-1830) [1].

There are a few essential Transform like Laplace, Sumdu, Mellin, Elzaki, and Temimi [23,4,13,14], and so on are accessible to tackle differential equations.

In 2016 [7] Atangna and Alkaltain. Introduces ((Novel Transform)) and applies for solving some differential equations [8,9]: new integral transform is defined as:

$$\mu(\sigma) = NI\big(\delta(t)\big)\frac{1}{\sigma}\int_0^{\infty} e^{\sigma(t)}\,\delta(t)\,dt, t > 0 \qquad (1)$$

In 2019 arose new Integral transform ((Sheue Transform)) used to tackle a few kinds

of differential conditions, Intensity Transport Conditions ,Additionally, it tends to be applied in certain fields like physical science engineering [10, 11,12] the basic change is characterized as :

$$ş[\gamma(t)] = \omega(d,f) = \int_0^{\infty} e^{\left(\frac{-d}{f}\right)}\,\gamma(t)\,dt, t > 0 \qquad (2)$$

Recently, in 2016 Xiao-Jun Yang introduced ((Yang Transform)) and applied to settle Consistent Intensity move issue [5].

In this exploration, new apply the Yang transform to get a recipe of general arrangements of direct differential conditions. In area 2, we checked on the properties of changes and the significant hypothesis for certain capabilities through the connection among Laplace and Yang transform. In area 3, we accomplished recipes of the overall arrangement of differential conditions of first, second, and higher-request. At last in the last segment, we applied general recipes got in.

2. Basic definitions and properties of Yang Transform

Definition

The Yang transform of the function ρ (t) is denoted by ¥{ρ (t)} or *T(s)*

and is defined as ¥[ρ (t)] =T(s)= $\int_0^\infty e^{\frac{-t}{s}}$ ρ (t) dt , t > 0 (3)

where ρ (t) ,t >0, is a real function, provided *the integral* exists for some s , where s ∈ (-t_1 ,t_2).

If we substitute $\frac{-t}{s} = \mu$then equati0n (1) becomes,

¥[ρ (t)] =T(s)=$s\int_0^\infty e^{-\mu}$ ρ $(s\mu)$ $d\mu$, μ >0 (4)

2.1 Laplace- Yang Duality Property:

If the Laplace Transform of the function ρ (t) *is* ρ (s), then

ρ (s)=$l\{\rho$ (t)}=$\int_0^\infty e^{-st}$ ρ (t) dt (5)

Substitute t= $\frac{\mu}{s}$ in the integral hand side we get

ρ (s)= $l\{\rho$ (t)}=$\frac{1}{s}\int_0^\infty e^{-x}$ ρ $(\frac{\mu}{s})$ dt

Hence from equation (5) :, get

ρ (s)=T$(\frac{1}{s})$ (6)

Also from equations (3) and (6): get

T(s)= ρ $(\frac{1}{s})$ (7)

2.2. Yang Transform of some functions:

Here we use Laplace- Yang duality T(s)= ρ $(\frac{1}{s})$where ρ (s)= $l\{\rho$ (t)},to define Yang Transform of some functions[1]

1)As L{1} =$\frac{1}{s}$implies¥ {1} = s

2) As L{t} =$\frac{1}{s^2}$implies¥ $\{t\} = s^2$

3) As L$\{t^n\}$ =$\frac{n!}{s^{n+1}}$ implies¥ $\{t^n\} = n!.s^{n+1}$

4) As L$\{e^{\delta t}\}$ =$\frac{1}{s-\delta}$ implies¥ $\{e^{\delta t}\} = \frac{s}{1-s\delta}$

5) As L$\{\sin \delta t\}$ =$\frac{\delta}{s^2+\delta^2}$ implies¥ $\{\sin \delta t\} = \frac{as^2}{1+a^2s^2}$

6) As L$\{\cos \delta t\}$ =$\frac{s}{s^2+\delta^2}$ implies¥ $\{\cos \delta t\} = \frac{s}{1+\delta^2s^2}$

7) As L$\{\sinh \delta t\}$ =$\frac{\delta}{s^2-\delta^2}$ implies¥ $\{\sinh \delta t\} = \frac{\delta s^2}{1-\delta^2s^2}$

8) As L$\{\cosh \delta t\}$ =$\frac{\delta}{s^2+\delta^2}$implies¥$\{\cosh \delta t\} = \frac{s}{1+\delta^2s^2}$

Theorem

If ρ (t), ρ'(t),……..,$\rho^{n-1}(t) are\ continuous\ for$ (t > 0)and of exponential order as t→ ∞ ,also $\rho^n(t)$ is continuous L$\{\rho$ (t)$\}$= γ(s), it follows that

Property: [5]

Let the function $\alpha\theta(t) and \beta u(t)$ be in set A then$[\alpha\theta(t) + \beta u(t)] \in A\ \alpha, \beta > 0$

arbitrary constants , so $\Psi[\alpha\theta(t) + \beta u(t)] = \alpha\Psi\theta(t) + \beta\Psi u(t)$

3. Formulas of the general solution for the differential equation

a-Consider the first –ordinary differential equation

$a_1\Psi'(t)+a_2\ \Psi(t)=$ €(t) , t > 0 , v(0)=ß (8)

Applying Yang transform of the equation (8) , we have:

¥[$a_1\ \Psi'(t)$]+ ¥[$a_2\ \Psi(t)$]=¥[€(t)]

$a_1[\frac{T(S)}{S}$ –v(0)]+$a_2\ T(S) =$ ¥[€(t)]

T(S) = $\frac{s(¥[€(t)]+a_1ß)}{a_1+a_2s}$ (9)

The inverse Yang transform of equation(9).

b- Consider linear ordinary differential equation of order tow

$a_1\Psi''(t)+a_2\Psi'(t)+a_3\Psi(t)=$ €(t), t >0 (10)

with the initial condition v(0)=ß$_1$ and $\acute{v}$(0)= ß$_2$

where a_1 , a_2 , a_3, ß$_1$ and ß$_2$ are constants €(τ)is an in tegrable function .

Taking Yang transform to both sides , we get :

$a_1¥[\Psi'(\tau)]+a_2¥[\Psi'(\tau)]+ a_3¥[\Psi(\tau)]= ¥[€(\tau)]$

$[a_1 \frac{T(s)}{s^2}-a_1\frac{v(0)}{s}-a_1\acute{v}(0)]+ [a_2\frac{T(S)}{S} – a_2v(0)]+ a_3\, T(S) = ¥[€(t)]$

$[a_1 \frac{T(s)}{s^2} -a_1\frac{ß1}{s}-a_1ß_2]+ [a_2\frac{T(S)}{S} – a_2\, ß_1]+ a_3\, T(S) = ¥[€(t)]$

$T(S) = \frac{s[s¥[€(t)]+a_1ß_1 +sa_1ß_2 +sa_2ß_1]}{a_1+sa_2+s^2a_3}$ (11)

After Taking the inverse of Yang transform for both sides of equation (11).

4. Applications

In this part, the approval and use completion of Yang transform are displayed by acquiring the overall arrangement

Example (1)

Solve the equation:

$\Psi' + \Psi= 2e^{\tau}$, $\tau > 0$, v (0)= 2 (12)

With the initial condition v (0) = 2, by using formula (1), we have:

$T(S) = \frac{s(\frac{2}{1-s}+2)}{1+s}$

By partial fractions, we obtain:

$$\frac{A}{1-s}+\frac{B}{1+s}$$

The inverse of Yang transform is given by:

$h(t)=Ae^{t}+ Be^{-t}$

Example (2)

For solving the equation

$\Psi''-3\Psi' +2\Psi= e^{-t}$; $t > 0$, *v (0)*=1 and $v'(0)=0$ (13)

By applying formula (2), we have:

$T(S) =s[\frac{\frac{s}{1+s}+1-3s}{1-3s+2s^2}]$

$T(S) =s[\frac{-2s^2-2s+1}{(1+s)(1-2s)(1-s)}]$

By using partial fractions, we have:

$T(S) =\frac{\frac{1}{6}s}{(1+s)} + \frac{\frac{3}{2}s}{(1-2s)} - \frac{\frac{2}{3}s}{(1-s)}$

$h(t) =\frac{1}{6}e^{-t} + \frac{3}{2}e^{t} - \frac{2}{3}e^{2t}$

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Evaluation of Serum level of Ghrelin, Adiponectin and Cholecystokinin and some Hematological variables in *Giardia lamblia* Infected Patients in Kirkuk city

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Abstract

Background: The parasite *G . lamblia* is one of the most widespread intestinal parasites that infect humans throughout the world, causing giardiasis. It is a single-celled parasite that has attracted scientific interest not only for its spread throughout the world, but for its internal membrane system as well. Therefore, the research aimed to evaluate the levels of Ghrelin, adiponectin and Cholecystokinin and some hematological variables in patients infected with the *G. lamblia* . **Objective**: The current study was designed to evaluation of *G. lamblia* infection effects on some biomarkers such as ghrelin , adiponectin and Cholecystokinin . **Methods**: The study was conducted on 80 patients infected with *G. lamblia* and 300 healthy people (control group), who attended the Al-Jumhuri general hospital of Kirkuk city from 1/4/2024-15/6/2024. **The results** : The results showed a significant (P<0.05) elevated in serum concentration of (Adiponectin , Cholecystokinin , White blood cell-WBC , Erythrocyte sedimentation rate -ESR , C-Reactive protein- CRP , IgM) and a significant decrease in concentration of (Ghrelin , Packed cell volume-PCV , Hemoglobin-Hb , IgA, Ig G) in *G. lamblia* infected patients compered healthy people. **Prevalence rate** :- The result showed that the infection rate with the *G . lamblia* parasite was 80 samples (26.6%), while 220 samples (73.4%) were uninfected. In terms of gender, the results showed that the highest percentage was for females, at 62.5%, compared to males, which recorded the lowest percentage, as It was 37.5%. **Conclusion**: Ghrelin , adiponectin and cholecystokinin and some variables are important physiological and hematological biomarkers that can support the diagnosis of *G. lamblia* parasite.

Keywords: *Giardia lamblia*; Gherlin; Adiponectin; Cholecystokinin

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1. Introduction.

Giardia lamblia is one of the most widespread intestinal parasites among humans, as it occurs in different proportions in different geographical areas (Yahya, 2014). as it infects more than 280 million people worldwide, and its impact is mainly on children (Hasan *et al*., 2021) who live in unsanitary conditions and in areas with high population density (Roshidi *et al*., 2021) The main causes of infection are consumption of contaminated water that is not treated adequately, and eating contaminated vegetables. The infection is transmitted from one person to another through fecal-oral transmission. The prevalence rate is high in areas that suffer from poor sanitation (Salamandane ., 2022 and Hiro., 2015) and water-borne diarrheal diseases cause all over the world around the world (Li., 2022).

Cholecystokinin -CCK is a peptide that reduces food intake. It is produced by intestinal cells in response to nutrient intake, (J. A. Williams., 2019). CCK release stimulates various parts of the CNS, including the brainstem, pons, hypothalamus, causing the inhibition of food intake to be blocked (P. D. Whissell *et al*., 2019).

Adiponectin is a hormone secreted from adipose tissue and has several names according to the description of the latter groups, as the concentration of adiponectin in plasma is about 5-30 mg/ml and it is one of the most abundant proteins in the blood circulation (0.01% of total proteins), and its biological effects The effect of adiponectin does not depend on its concentration in the blood Just put its importance in the expression of the number of different forms of receptors in various tissues, and adiponectin plays an important role in regulating metabolism, preserving energy in the body's main organs, which are the liver and skeletal muscles, and several studies have clarified the role of adiponectin on various organs (Galindo *et al*., 2017) ,many studies have shown that adiponectin plays an important role in the process of regulating sugar and fat metabolism, and adiponectin can increase the oxidation of fatty acids in skeletal muscles and the sensitivity of peripheral tissues to insulin It prevents hepatic glucose. It has been suggested that adiponectin has a protective effect on the development of atherosclerosis, in various animal models of obesity. In diabetes, it has been found that adiponectin has a relationship with insulin sensitivity, and it has been proven Adiponectin has an important role in the inflammatory response (FAI-Azzawie and al-Awadhi., 2014).

Ghrelin gut peptide, is secreted in large quantities, mainly from the stomach, in humans . It can perform the biological function of activating the growth hormone secretagogue receptor. Since its discovery in 1999, ample research has focused on promoting its effects on the human appetite and pleasure–reward eating.((Zheng., 2022). The stomach secretes approximately 60-

70% of gherlin , and the rest of it originates in the small intestine (Abdalla., 2015). The level of gherlin increases during fasting and decreases quickly after eating, and it has a role in energy balance and satiety, since it is a multidirectional hormone with functions through its effect on energy balance and diabetes. Therefore, increasing food intake and the effect on growth hormone affects obesity and diabetes (Hussein *et al*., 2014).

Study design

Collection of blood: The study was conducted on 80 patients infected with *G. lamblia* and 300 healthy people (control group), who attended the Al-Jumhuri general hospital of Kirkuk city from 1/4/2024-15/6/2024 . samples of people of reproductive age, ranging in age from (18-35) years. The medical conditions of people infected with the parasite *G. lamblia* were confirmed after confirming the symptoms of the disease, including diarrhea or dysentery. after that, blood was taken from the two groups (patients and healthy people) and separated using a centrifuge, and then the level of their blood and biochemical variables was measured at the probability level $P \geq 0.05$. The current study was designed to evaluation of *G. lamblia* infection effects on some biochemical such as Ghrelin, adiponectin and Cholecystokinin in blood serum were estimated using a kit Cloud-clone corp prepared by the company American , As for the hematological variables , the number of white blood cells was calculated according to the researcher's method (Ahmid and salhi , 1994), while the volume of compressed blood cells was measured according to the researcher's method (Haillman and Ault, 2002), as for hemoglobin, it was calculated according to the law of the researcher's method (Rodac ., 2002), and the red blood cell sedimentation rate was measured according to (Brown., 1976) method. As well as the C-reactive protein this test depends on the immune reaction that occurs between C-reactive protein Human antibodies and antibodies corresponding to the human CRP antigen are bound to latex particles. A negative reaction indicates that there is no agglutination, while a positive reaction indicates a visible and clear (ridker *et al*., 2005).

Statistical analysis

The data were analyzed by SPSS version 27. The differences of significant M ± SD were measured by Independent-Samples T test. A probability of (P) value <0.05 is regarded significant.

Results: Parasite infection rates with *Giardia lamblia*

Table 01- shows the rates of parasite infection with *Giardia lamblia*

Giardia lamblia	**Number**	**%**
Total sample	300	100
Positive	80	26.6
Negative	220	73.4

Rates of parasite infection with *Giardia lamblia* by gender

Table 02- shows the rates of parasite infection with *Giardia lamblia* by gender

Giardia lamblia	**Number**	**%**
Total sample	80	100
Male	30	37.5
Female	50	62.5

Estimation of the hematological variables , gherlin , adiponectin , Cholecystokinin , in the two study groups:

Table 03- shows the mean ± S.D of all parameter in the two study groups.

Groups / Parameters	**Mean ± SD**	
	Control (n = 300)	Patients (n = 80)
WBC	5.5±0.865	11.441±2.561
PCV%	46.451±3.765	38.324±3.243
ESR (mm/hr)	23.209±4.674	30.654±3.541
Hb (g/dl)	16.431±3.278	10.531±3.342
Gherlein (ng/ml)	85.241±3.765	25.876±3.875
Adiponectin(µg/ml)	2.76±0.221	4.54±1.211
Cholecystokinin (ng/ml)	28.321±4.65	34.654±4.765
CRP (mg/L)	4.5±0.431	16.54±4.342
IgA (mg/dl)	240±11.643	115±19.643
IgG(mg/dl)	1140±18.431	1012±9.5
IgM(mg/dl)	140±10.65	145±7.32

*** p ≤ 0. 05**

The results of the current research showed a significant elevated in (WBC, ESR, CRP, IgM. Adiponectin, Cholecystokinin) concentration and a significant decrease in (PCV, Hb , IgA, IgG, gherlin) concentration in the serum of patients compered to healthy people). at the probability of $P \leq 0.05$. as in the following figures:

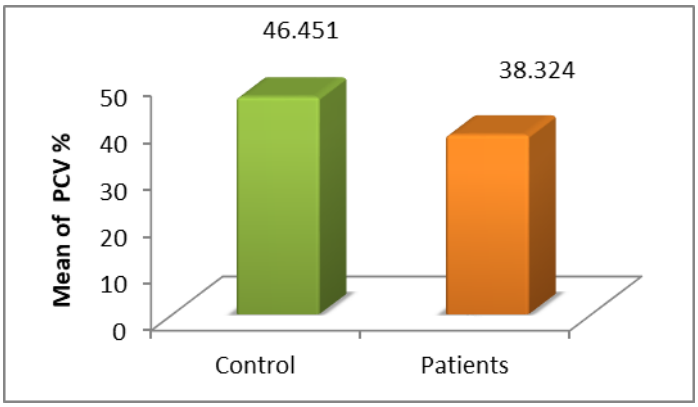

Figure 01- WBC concentration in the blood serum of both groups

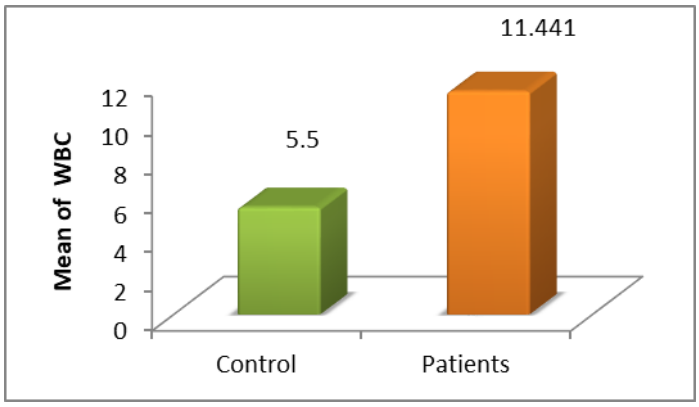

Figure 02- PCV concentration in the blood serum of both groups

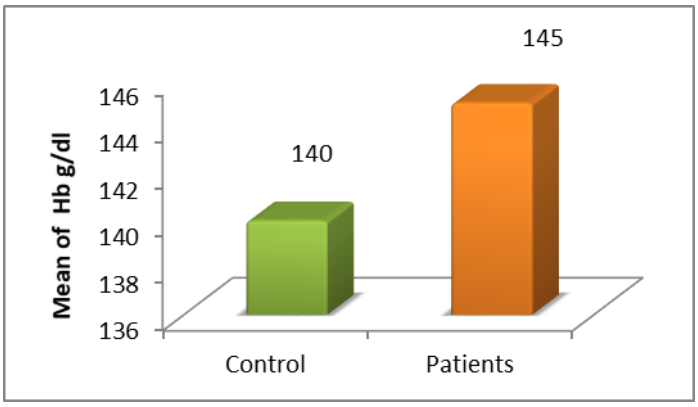

Figure 03- ESR concentration in the blood serum of both groups

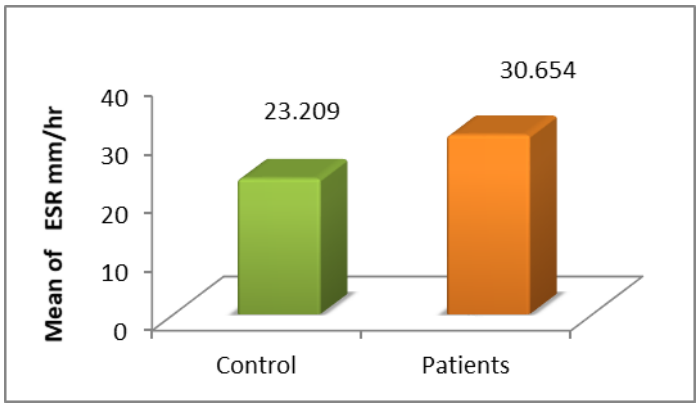

Figure 04- Hb concentration in the blood serum of both groups

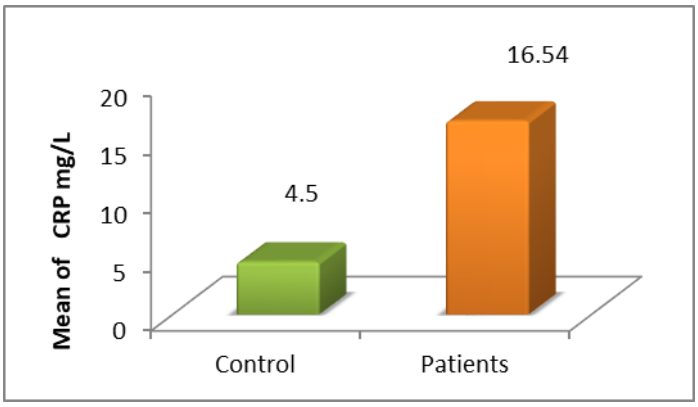

Figure 05- CRP concentration in the blood serum of both groups

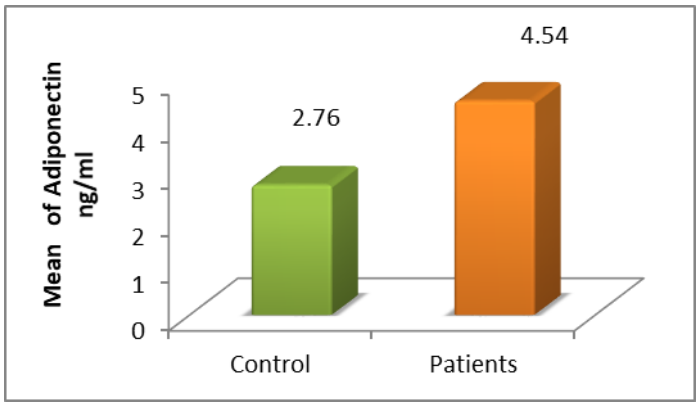

Figure 06- Gherlin Concentration in the blood serum of both groups

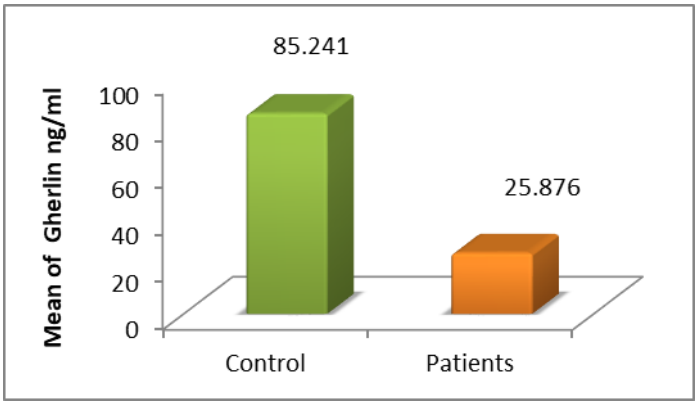

Figure 07- Adiponectin concentration in the blood serum of both group

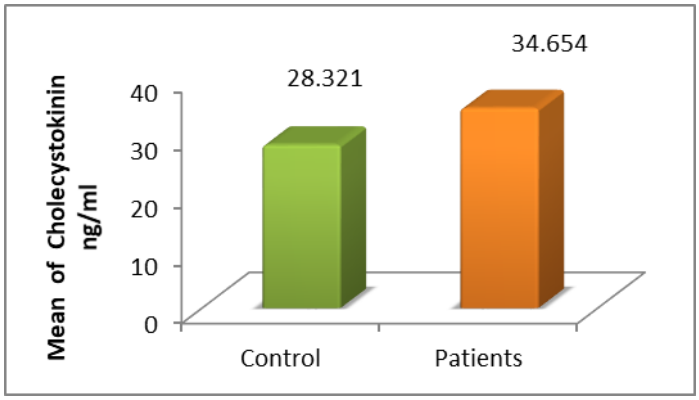

Figure 08- Cholecystokinin concentration in the blood serum of both groups

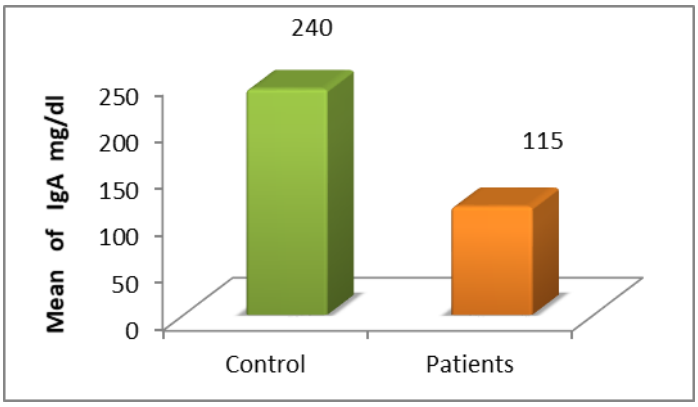

Figure 09- IgA concentration in the blood serum of both groups

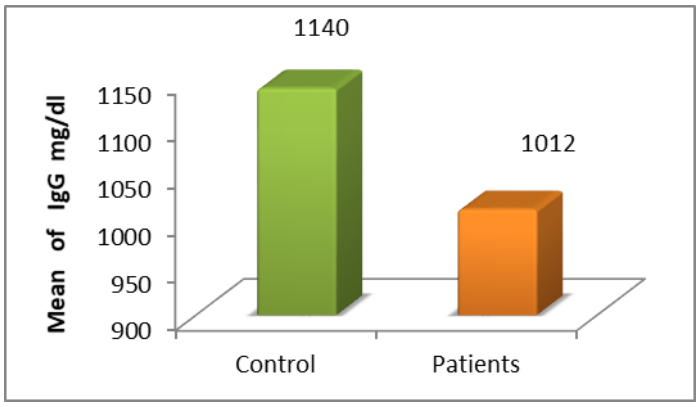

Figure 10- IgG concentration in the blood serum of both groups

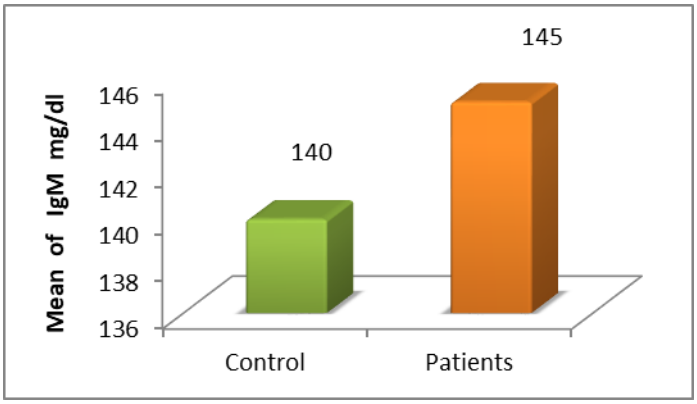

Figure 11- IgM concentration in the blood serum of both groups

Discussion

The results of the current study indicated that there was a discrepancy in the rates of infection with the *G. lamblia* parasite, as the results showed that the highest rate was for females compared to the lowest infection rate for males. The results agreed with a study (Hajissa et al., 2020) conducted in Sudan, which showed that the highest infection was with the *G. lamblia* parasite, as it was 13%, among other parasites. The results of the study did not agree with (Mohammed *et al*., 2020) what was found in Kirkuk, as it was found that the average infection

rate with Giardia among males was slightly higher than that of females, as it was 34.14 and 32.85, respectively.

The results of the current research showed an increase in the total mass of red blood cells and decrease in concentration of hemoglobin and PCV, as the results were agree with (al mousawi and neamah, 2021).

It results in the presence of a concentration of hemoglobin and the amount of packed cells is large quantities in the body due to the effect of infection with parasites that calcify the villi and intestinal forests, which leads to a defect in the process of absorption and secretion. Use and then taking the intestinal contents alone is easier, which is one of the most important symptoms, leading to the patient receiving many substances. Including sugar, fat, vitamins and iron (Rey., 2001). also The results indicated a high rate of erythrocyte sedimentation, as the results were revealed with what was indicated by (Mohsen and Daoud, 2015), as it was concluded that the reason for the high rate of erythrocyte sedimentation is due to the fever that the affected people suffer from, or it may be due to anemia that The patient suffers from it.

As for the level of C-reactive protein, the results indicated an increase in its concentration in patients infected with the parasite, as the results agreed with the findings of (al Ezzy *et al*., 2015) as the high concentration of CRP may be due to advanced age and the chronic appearance of diarrhea caused by the parasite (al Ezzy *et al*., 2015) or it may be due to the large number of The infectious phases of the Giardia parasite that were ingested for a long period of time, and the period of infection caused an increase in the activity of the liver cells to increase the synthesis of the reactant in the acute phase, and on the other hand, tissue damage resulting from the attachment of the parasite to the surface of the mucous membrane, which represents a continuous stimulus for the liver cells to increase protein synthesis (al Ezzy *et al*., 2015).

On the other hand, the results of the current research showed an increase in adiponectin levels in patients infected with the parasite, and this is consistent with the results of the study (Lina., 2022). the parasite damages portion of the intestinal brush border membrane, which is necessary for the absorption of nutrients such as glucose (. Delling., 2019). Infection with G. lamblia causes epithelial barrier failure, which It leads to glucose, salt, and water malabsorption as well as a reduction in disaccharidase activity due to a loss of absorptive surface area (Allain., 2017).

The results of the current study indicated a decrease in the level of Ghrelin in patients infected with the parasite, and this is consistent with other studies (Saleem., 2016 and Rana.,

2021). It may be believed that the reason for the decrease in Ghrelin may compensate for the increase in glucose concentration (Erensoy., 2010).) The reason for the decrease is also attributed to loss of appetite in patients suffering from parasite infection (De Vriese., 2007), or due to lipid peroxidation that increases due to the parasite (Primo-Parmo., 1996 and Kılıc., 2004).

The results of this study agree (Al-Hadraawy *et al*., 2016 and Ernsoy *et al*.,2010) It has been found that Giardia parasites colonize the duodenum and jejunum by attaching to the intestinal epithelium, so intestinal hypermotility in infected patients may cause a decrease in Ghrelin levels (Eckmann., 2003). Therefore, inflammation caused by fat malabsorption may lead to the destruction of the mucosal barrier of the small intestine (Schoultz., 2019).

The results of the current research indicated an increase in concentration of Cholecystokinin in patients infected with the G. lamblia. previous studies have shown increase in bowel movement also describes an increase in CCK levels in the colon of mice infected with Giardia, CCK typically results in the release of bile salts to aid in fat dissolution and absorption, although bile is readily used by Giardia protozoans during growth. Parasite-mediated CCK release should be beneficial to the parasite during infection (Peón., 2016 and Li L-H, Zhou., 2007).

The results of the current study indicated that there were significant differences in the concentration of immune globulins in the serum of the patient group compared to healthy people. The results of the current research showed a decrease in the level of IgA for those infected compared to the control group. These results differ with the study (Sabaa and mohammad ., 2021), which recorded an increase in the concentration of IgA. an elevated in the level of IgM was observed in the serum of a group of patients infected with the parasite and those suffering from diseases including diabetes. The results also indicated a decrease in the level of IgG in those infected compared to the control group. The results did not agree with the study (Ali *et al*., 2018), as they recorded an increase in the level of IgG. The reason for the high level of IgM is attributed to the fact that patients have passed the early stages of the infection (Ali *et al*., 2018).

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Optimizing Resource Allocation in Cloud Data Centers through Multi-Objective Scheduling Algorithms: A Comparative Analysis of Performance, Cost, and QoS Metrics

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Abstract

Cloud record facilities provide flexible and scalable surroundings for executing loads of workloads. However, efficient useful resource allocation is crucial for the effective transport of cloud offerings, making sure they're fee-efficient and keep Quality of Service (QoS). Multi-Objective Scheduling Algorithms (MOSAs) have emerged as a promising solution to balance performance, value, and QoS metrics in cloud environments. This study investigates the effectiveness of numerous MOSAs for optimizing useful resource allocation in cloud workloads. We behavior a comparative has a look at of several algorithms, assessing their overall performance, fee implications, and QoS metrics across various cloud situations. Our method includes a quantitative analysis of execution time and fee, along with a qualitative assessment of QoS attributes inclusive of availability, reliability, and response time. Additionally, we discover how wonderful workload traits along with batch processing, real-time processing, and fact-intensive analytics impact the performance of those algorithms. The findings will provide valuable insights into the strengths and weaknesses of various scheduling algorithms and inform the future layout of greater effective cloud scheduling structures.

Keywords: Peristaltic flow; QoS Metrics; Multi-Objective Scheduling Algorithms ; Cloud

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Introduction

Cloud computing has become critical to the fashionable generation, importing customers with numerous offerings and packages reachable anywhere at any time. The dynamic and flexible nature of cloud assets renders them an attractive option for corporations, allowing for a scalable infrastructure that reduces charges and complements performance. Nonetheless, the project of greatest resource allocation in cloud environments persists. At the same time, a couple of objectives together with response time, strength intake, value, aid utilization, reliability, best of carrier, safety, and fairness must be considered.

MOSAs have been developed to tackle this assignment, aiming to optimize more than one target simultaneously and offering an extra holistic way to cloud resource allocation. To increase the ones algorithms, more than a few optimization strategies, together with Genetic Algorithms (GA), Ant Colony Optimization (ACO), Particle Swarm Optimization (PSO), and deep reinforcement studying, were applied.

This study aims to explore the panorama of MOSAs in cloud computing. We will review the current literature on this topic, inspecting the unique techniques and considerations involved in developing those algorithms. Furthermore, we will identify capacity avenues for future studies in this domain.

Literature Review:

As the sphere of cloud computing continues to develop unexpectedly, powerful task scheduling has become increasingly important due to the numerous and dynamic nature of cloud resources. Below, we summarize key research applicable to this study's topic.

Zhang, Y., Wang, L., & Huang, X. (2024) Proposed a hybrid multi-goal optimization algorithm that integrates genetic algorithms with particle swarm optimization to enhance resource allocation efficiency. Their reviews of conventional techniques suggest significant enhancements in each performance and cost-effectiveness.

Kumar, R., & Singh, P. (2023) Targeted harmonizing overall performance and price in cloud computing via a multi-goal scheduling algorithm that dynamically adjusts resource allocation primarily based on real-time calls, optimizing operational charges and provider fine.

Ali, A., & Ahmed, S. (2023) Introduced a fuzzy logic-based multi-objective optimization framework for adaptive resource allocation in cloud information centers. Their studies highlight how fuzzy logic contributes to advanced choice-making amidst uncertainty, leading to enhanced QoS results.

Chen, M., Li, X., & Zhang, J. (2022) Addressed electricity performance as a crucial objective in aid allocation. Their multi-objective optimization framework emphasizes strength financial savings along with performance and value, attaining sizeable discounts in strength consumption in cloud facts centers.

Wang, L., Zhang, Y., & Qian, Z. (2022) Explored the implementation of multi-objective evolutionary algorithms to optimize aid allocation even as retaining QoS. These algorithms were examined across numerous cloud scenarios, showcasing adaptability to one-of-a-kind workload patterns at the same time as ensuring reliability.

Patel, M., & Shah, N. (2021) Provided a fee-efficient multi-goal scheduling set of rules designed in particular for small to medium-sized companies utilizing cloud services. This algorithm strikes a balance between minimizing operational prices and maximizing system performance.

Garg, S. K., & Buyya, R. (2021) Performed a complete survey evaluating numerous multi-goal useful resource allocation techniques in cloud computing. They analyzed the exchange-offs among value, overall performance, and QoS, presenting an in-intensity dialogue at the benefits and boundaries of every method.

Wang et al. (2021) Developed a multi-objective hybrid genetic set of rules centered on strength-efficient assignment scheduling in cloud computing, addressing each electricity intake and challenge finishing touch period.

Zhang et al. (2021) Mounted a multi-objective particle swarm optimization algorithm objective as a business process in a cloud environment, factoring in each execution time and cost.

Xie et al. (2021) proposed a gold-standard multi-objective optimization method for cloud scheduling, encompassing electricity intake and time concerns.

Wu et al. (2021) Proposed objectives for developing code tailor-made for dynamic commercial enterprise procedures in cloud systems, assessing the complexity, execution time, and cost.

Ranjan, R., Rahman, M. A. (2020). The present study introduces a singular framework that integrates several goal optimizations and gadget learning methodologies to enhance the performance of inexperienced help structures in cloud recording environments. Their layout achieves a commendable equilibrium among general system performance, cost, and first Quality of Service (QoS).

(2020) Xie, J., and Xu, X. Investigation of the exchange-offs involved in multi-goal structures for cloud resource management. Their studies offer precious insights on how planning tactics may be changed to effectively prioritize unique desires, together with decreasing prices or enhancing universal performance.

Huang and co-workers (2020) Implemented a progressive task-making plans scheduling approach using an innovative cuckoo. They sought a set of rules to lessen electricity usage while preserving sustainability throughout all enterprise ranges.

Liu et al. (2020), A good-sized exam of challenge scheduling strategies in cloud computing systems was undertaken by specializing in numerous algorithms particularly designed for enterprise scheduling.

Zhang et al. (2020) added adaptable restrictions on cloud computing that assign resources to obligations in keeping with priority and complete adherence to equity boundaries.

Multi-objective Scheduling Algorithms (MOSAs)

MOSAs are a category of algorithms developed to optimize numerous targets simultaneously at some point of the scheduling of offerings in cloud information facilities. The optimization standards most usually pursued in cloud computing encompass reaction time, resource use, power consumption, charge, and carrier first-class.

Traditional systems generally prioritize other goals, including reaction time, while brushing off micro-level traits. Analytically, Multiple Objective Sequence Algorithms (MOSAs) accomplish several dreams simultaneously, with the aim of determining the most tailored response in terms of all objectives.

Numerous variations of MOSA have been documented in the literature, encompassing GA, PSO, ACO, simulated annealing, and multi-intention dynamic programming. These algorithms hire numerous optimization strategies and heuristics to research the variety of feasible responses and verify the closing final results.

An inherent gain of employing MOSAs is their capacity to pick out an answer that harmonizes contradictory goals and is subsequently reinforcing. By manner of instance, a set of rules can provide numerous powerful answers regarding each reaction time and strength performance, however, with varying degrees of consistency.

Analysis of Trade-offs Between Performance, Cost, and QoS Metrics

Critical for growing green cloud scheduling algorithms is the analysis of the alternate-offs between overall performance, fee, and QoS measures. Performance metrics usually determine the making plans device's capability to satisfy person goals, while fee metrics examine the financial effectiveness of useful resource allocation. Quality of Service (QoS) metrics pertain to the assessment of service high-quality presented by the cloud issuer, encompassing criteria together with reaction time, dependability, and protection. Striking a stability among these indicators is vital for reaching surest and productive allocation of cloud assets.

Researchers have devised MOSAs to research these alternate-offs by using actively optimizing several goals concurrently. By tackling numerous desires, those systems can provide a comprehensive answer that harmonizes advertising across quantitative measures. For example, a scheduling machine would possibly allocate precedence to reaction time and assets, while simultaneously integrating cost and nice of carrier (QoS) elements.

Conducting an analysis of the exchange-offs among performance, value, and QoS signs is crucial for the development of strong cloud scheduling algorithms. In general, overall performance metrics determine the program system's potential to fulfill purchaser requirements, whereas objective metrics compare the economic efficiency of help distribution. Quality of Service (QoS) metrics refer to the evaluation of the service quality provided by the cloud company. These metrics encompass several factors of response time, dependability, and protection. Achieving equilibrium among the measurements is crucial for the efficient and powerful allocation of treasured cloud resources. To investigate those elements, pupils have devised MOSAs that maximize two sets of goals. By addressing many desires, those structures can offer complete information that stabilizes the company primarily based on various quantitative measures. As an illustration, a device scheduling gadget might concurrently offer better importance to response time and assist processing time, introducing considerations of value and exceptional service. The development of the MOSAs involved numerous optimization methods, genetic layout, and microstructure optimization. These algorithms have gone through a complete investigation through simulation-based exams that investigate their basic overall performance, value, and quality of service (QoS) standards, as given in Table_1.

Table 01 Comparing algorithms using multiple parameters

Algorithm	Performance Optimization	Cost Optimization	QoS Optimization	Scalability	Robustness
MOACO*	65%	85%	65%	60%	85%
MO-GWO**	70%	85%	70%	85%	85%
NSGA-II***	85%	70%	85%	65%	70%
NSGA-III***	90%	75%	90%	85%	75%

* **MOACO** = Multi-objective Ant Colony Optimization.
** **MO-GWO** = Multi-Objective Grey Wolf Optimizer.
*** **NSGA** = Non-Dominated Sorting Genetic Algorithm.

Application of MOSAs for Resource Allocation Optimization

The use of MOSAs for distributed storage is a specialty of study in cloud computing. These algorithms attempt to optimize resource allocation in a cloud environment by considering several objectives, including reduced response time, higher resource utilization, and reduced cost. Table_2 shows the different applications using different MOSAs.

Table 02 Applications of MOSAs

Application	MOSAs	Description
Big Data Analytics	NSGA-II, NSGA-III, MO-GWO	Enhances useful resource allocation for records-extensive duties such as data mining, analytics, and huge-scale computations by means of balancing overall performance, fee, and useful resource utilization to boost performance and minimize processing time.
Machine Learning	MO-GWO, NSGA-III, MOACO	Optimizes useful resource allocation for training and executing gadget mastering fashions, focusing on reducing schooling time, enhancing accuracy, and enhancing useful resource utilization for advanced model overall performance.
Real-Time Processing	MO-GWO, MOACO	Allocates resources for real-time processing duties such as streaming programs, gaming, and multimedia, with an emphasis on low latency, excessive throughput, and efficient aid usage for seamless performance.
Resource Management	NSGA-II, NSGA-III, MO-GWO	Facilitates aid allocation for a variety of cloud workloads, which includes internet packages, databases, and services, even as balancing overall performance and cost to ensure powerful useful resource usage and workload control.

MOSAs in Cloud Computing

MOSAs inside cloud computing are hired to optimize useful resource allocation among diverse workloads, primarily based on numerous objectives which includes performance, fee, electricity consumption, and reliability. These algorithms are crafted to balance those diverse targets, facilitating the maximum green use of available sources, thereby improving the overall effectiveness and efficiency of cloud computing. Table_3 below offers specific use instances for MOSAs in cloud environments.

Table 03 Use Cases of MOSA in Cloud

Use Case	MOSAs	Description
Big Data Analytics	NSGA-II, NSGA-III, MO-GWO	This method optimizes useful resource allocation for duties related to information-intensive processing, such as facts mining, analytics, and large-scale computations. It achieves a balance amongst overall performance metrics, fee, and resource usage to enhance efficiency and decrease processing time.
Machine Learning	MO-GWO, NSGA-III, MOACO	This method optimizes useful resource distribution for education and executing device mastering fashions, emphasizing the minimization of education time, maximization of accuracy, and the optimization of resource usage to enhance universal version overall performance.
Real-Time Processing	MO-GWO, MOACO	This technique optimizes useful resource allocation for actual-time processing tasks, inclusive of streaming facts packages, gaming, and multimedia processing. It prioritizes low latency, high throughput, and efficient aid utilization to ensure easy performance.
Resource Management	NSGA-II, NSGA-III, MO-GWO	This method optimizes aid allocation for numerous cloud workloads, encompassing internet programs, databases, and offerings. It goals to stability overall performance, cost, and other standards to make certain efficient aid use and powerful workload control.

Challenges of MOSAs in Cloud

MOSAs encounter numerous challenges within the area of cloud computing. Table four examines some of the sizable challenges.

Table 04 MOSAs Challenges in cloud

Challenge	Description
Complexity	Implementing multi-objective scheduling algorithms affords complexity and challenges due to the need of thinking about multiple goals, constraints, and optimization criteria simultaneously.
Scalability	Addressing scalability is a sizeable task, as those algorithms have to correctly manage big-scale cloud environments comprising numerous resources and workloads. Ensuring most beneficial overall performance in percentage to device size will increase is often difficult.
Resource Allocation	Efficient aid allocation is vital yet hard because of the dynamic nature of cloud environments, fluctuating workload demands, and the vital to balance more than one objectives, inclusive of performance, price, strength consumption, and best of carrier.
Quality of Service (QoS) Optimization	Optimizing QoS metrics which includes response time, throughput, and reliability while integrating numerous objectives is complex. It necessitates sophisticated algorithms able to adapting to fluid workload styles and useful resource availability.
Heterogeneous Environments	Cloud environments frequently exhibit heterogeneity with numerous resources, along with CPU, GPU, memory, and storage. Designing algorithms that could efficiently allocate resources across various hardware and software program configurations poses a widespread mission.
Dynamic Workloads	Cloud workloads can be highly dynamic, experiencing speedy fluctuations in needs. Multi-goal scheduling algorithms ought to be designed to adapt in real-time to those changes and optimize aid allocation to keep green performance.
Security and Privacy	Ensuring safety and privateness in the course of the optimization of resource allocation is important but hard. Multi-tenant environments necessitate algorithms which can efficaciously allocate resources without compromising safety or breaching privacy guidelines.

Integration of MOSAs with Cloud Management Platforms

The integration of MOSAs into cloud management systems represents a large studies avenue, emphasizing the improvement of techniques to incorporate these algorithms seamlessly inside cloud control structures.

Cloud management systems act as an abstraction layer among the underlying cloud infrastructure and the packages and services operating atop it. By embedding MOSAs in those platforms, it turns into viable to enhance the overall performance and performance of the

complete device without necessitating alterations to the foundational infrastructure or programs.[4]

Integrating MOSAs with cloud control platforms might also require the improvement of APIs and person interfaces. These enable seamless get entry to and integration of such algorithms with present day control tools. Additionally, new management modules or plugins would possibly need to be created to include these algorithms into the platform.

A massive advantage of incorporating MOSAs with cloud control platforms is the simplification of dealing with complex cloud environments. By automating useful resource scheduling and optimizing workload placement, those algorithms can lessen the need for guide interventions, thereby enhancing the device's universal performance.

Evaluation of MOSAs in Cloud Environments

Assessing the effectiveness of present multi-objective scheduling algorithms in real-world cloud environments is a crucial location of research targeted on evaluating the practicality and performance of those algorithms. These algorithms intention to optimize multiple goals simultaneously, along with reaction time, strength consumption, fee, and resource utilization in cloud settings.[4]

Current MOSAs have been advanced and assessed via simulation-primarily based experiments that gauge their performance throughout several goals. However, simulated experiments may not absolutely seize the intricacies and variability of real cloud environments. Thus, it's far crucial to evaluate the effectiveness of those algorithms in real-world contexts to verify their practicality and effectiveness.[5]

The assessment method generally involves multiple stages: test layout, records collection, analysis, and end result interpretation. Experiment design encompasses selecting a sequence of MOSAs and structuring experiments to assess their performance in actual-global cloud settings. Data series entails collecting data from the experiments, which includes response time, energy utilization, value, and useful resource usage. The evaluation section consists of interpreting the accrued statistics to evaluate the overall performance of the scheduling algorithms, even as the end result interpretation stage specializes in deriving conclusions from the outcomes.[6]

Metrics for Evaluating Existing MOSAs in Cloud Environments

The effectiveness of current MOSAs in real-global cloud conditions is normally measured the use of a whole lot of metrics, which includes:[6]

1. Response Time: This measures the duration required for the cloud device to process and entire a user request.
2. Resource Utilization: This metric assesses the volume to which available computing resources are utilized within the cloud machine.
3. Energy Consumption: This measures the entire electricity expended by the cloud device in processing user requests.
4. Cost: This encompasses the economic implications tied to processing user requests inside the cloud, such as energy, protection, and hardware prices.
5. Quality of Service (QoS): This suggests how nicely the cloud machine aligns with user expectancies regarding overall performance, reliability, and protection.

Comparison of MOSAs in Cloud Environments

Comparing MOSAs in the cloud is complicated because of different factors, such as the unique goals being centered, the forms of workloads, and the traits of the cloud surroundings. Nonetheless, a few general comparisons can be made primarily based on multiple factors:[7]

1. Performance: Algorithms may be assessed based totally on their effectiveness in optimizing performance metrics along with response time, throughput, and useful resource usage. Certain algorithms may additionally excel with precise workloads, distinguishing between batch and real-time processing depending on their innate characteristics.
2. Cost: The capability to optimize price-related metrics, along with useful resource utilization and strength intake, serves as a foundation for comparing MOSAs. Some may be extra appropriate for environments concern to stringent value regulations, while others may show off extra flexibility in aid allocation.
3. Robustness: Evaluating an set of rules's potential to control surprising situations and adapt to fluctuating situations in the cloud surroundings displays its robustness. Algorithms exhibiting high resilience may be extra appropriate for environments characterized by means of extensive variability and uncertainty.
4. Scalability: Algorithms are also assessed concerning their capability to manage substantial cloud environments, potentially encompassing lots or millions of sources. Scalable algorithms may show extra effective in environments with elevated resource usage and demand.

The strengths, weaknesses, and gold standard programs of decided on MOSAs may be illustrated in Table_5, considering different factors:[7]

Table 05 Strengths and Weaknesses of MOSAs.

Algorithm	Strengths	Weaknesses	Best Suited For
NSGA-II	Effective at discovering diverse solutions	May face challenges with scalability	Batch processing, data analytics
NSGA-III	Handles constraints and Pareto dominance efficiently	Complexity escalates with increasing objectives	Resource management, job scheduling
MO-GWO	Rapid convergence and low computational cost	May need fine-tuning for optimal performance	Real-time processing, machine learning
MOACO	Capable of managing dynamic environments effectively	Requires parameter adjustment	IoT applications, dynamic workloads

Design and Development of New MOSAs for Cloud Data Centers

Cloud data facilities are complex structures necessitating green and powerful scheduling algorithms to allocate assets and address consumer desires. MOSAs for cloud facts center consciousness on optimizing various goals concurrently, along with response time, power usage, fee, and resource utilization. The introduction of recent MOSAs for these facilities represents a sizable research domain that can enhance cloud-useful resource distribution and enhance user reports. Researchers use optimization techniques such as genetic algorithms, particle swarm optimization, ant colony optimization, and deep reinforcement studying to expand new MOSAs for cloud facts platforms. This method permits the enhancement of scheduling algorithms to handle numerous goals and negotiate the related exchange-offs. The system of creating new MOSAs normally encompasses several levels: problem formulation, algorithm design, implementation, and evaluation. The problem method includes defining the goals and constraints of the scheduling challenge, even as a set of rules layout entails selecting an optimization method and devising a scheduling set of rules capable of optimizing a couple of desires. Implementation includes developing software to set up the scheduling algorithm inside a cloud data middle, and evaluation consists of testing the set of rules through simulation-primarily based experiments. Researchers have added numerous new MOSAs for cloud information facilities, including the Multi-Objective Bat Algorithm (MOBA), the Multi-Objective Cuckoo Search Algorithm (MOCSA), and the Multi-Objective Firefly Algorithm (MOFA). These algorithms were assessed via simulation-based experiments that examine their performance across several goals along with reaction time, energy intake, and value.

The design and development of new MOSAs for cloud information centers represents a promising research avenue that can enhance cloud resource allocation and improve customer reviews. By creating scheduling algorithms that simultaneously optimize multiple targets, researchers can facilitate more green and effective cloud-useful resource allocation that aligns with consumer necessities while maximizing monetary efficiency and provider quality.

Conclusions

Literature evaluation shows that MOSAs have become a huge study area of cloud computing. Multiple procedures had been counseled to optimize certain goals, in general leading to stepped forward reaction times, reduced power intake, reduced expenses, multiplied assistance usage, enhanced dependability, improved exceptional of provider, expedited safety, and accelerated fairness in cloud scheduling. The implemented strategies encompass genetic algorithms, particle swarm optimization, ant colony optimization, and deep reinforcement mastery, amongst other approaches. To summarize, multi-aim scheduling methods decorate cloud usable aid allocation optimization, thereby improving performance throughout unique goals. Moreover, there is nonetheless enough opportunity for similar research in this discipline, which includes investigating present-day optimization strategies and incorporating supplementary elements into the scheduling device. First and principal, powerful and strong scheduling algorithms are vital for optimizing the benefits of cloud computing and enhancing the general consumer experience.

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