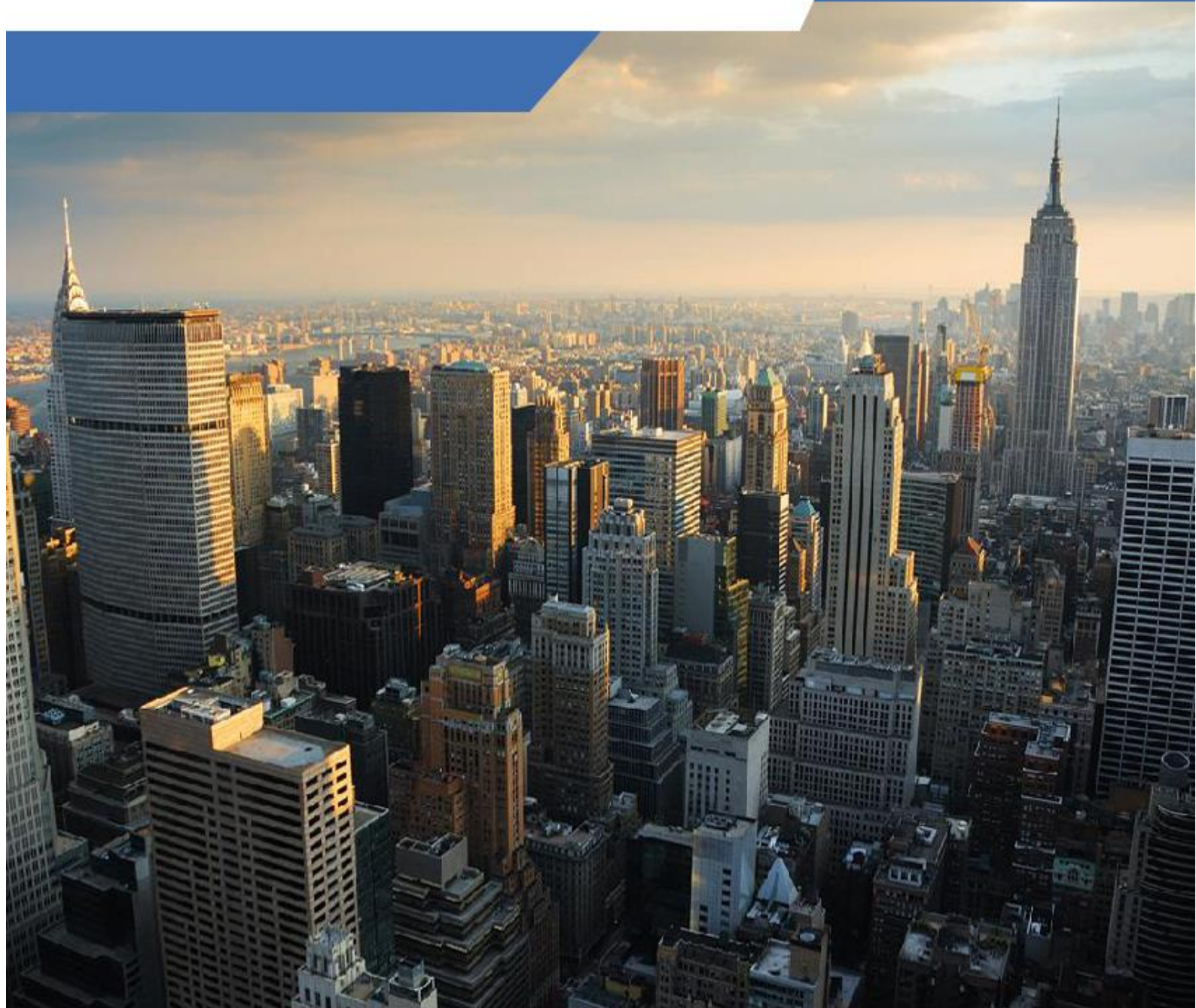


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Article

Impact of Control on Elite Football Players' Athletic Skills

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Abstract: The current research aimed to explore the relationship between intentional control and mental skills of elite football players in Baghdad Governorate during the 2023/2024 season. Recognizing the significance of mental skills in athletic performance, this study addresses a gap in understanding how intentional control impacts these skills among top-tier athletes. The study utilized a descriptive and correlational research method, involving a sample of 170 players from the Iraqi elite league, representing 86.44% of the total research population. Data were collected using the Intentional Control Scale by Ismail (2022) and the Psychological States Scale by Bell, Benson, and Shambrook (1996), with analysis conducted via SPSS version 25. Results indicated that elite players exhibit high levels of both intentional control and mental skills, with a significant positive correlation between the two. These findings suggest that enhancing intentional control may further improve the mental skills essential for elite football performance.

Keywords: intentional control, mental skills, elite football players, Baghdad Governorate, correlational research

1. Introduction

Importance of the Research :

In recent times, psychology is witnessing great importance and great importance, as it was classified at the forefront of the sciences that met the interest of those working in the field of sports, where they began with the technological development and scientific progress to give importance to the psychological state of the player through their focus on the intellectual and psychological aspect of all sports and the game of football in particular, where attention was focused on some variable and unstable psychological traits and states that contribute to the development of players' abilities.

The control of attention is very important for the football player through the issuance of correct decisions because it depends largely on the cognitive system, and what characterizes the cognitive system is the specific capacity and it has become necessary to determine the size of the stimuli received by the player through his senses and this type needs organization and legalization of stimuli and how to deal with them without disturbing focus, attention and making the right decisions.

Also, in order to contribute to reaching the state of high performance and the development of high skills and speed in high performance, it is necessary to rely on mental skills, which represent the most important dimension in the preparation of football players, because of its fundamental importance to the development of performance, so it has become considered one of the most important abilities that must be paid attention to along with skill, physical and planning abilities in order to reach high ability and under any variable of the game, that the development of some relaxation

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skills, concentration, mental retrieval and other skills must go along with the development of physical fitness and skill elements through training programs and must be promoted.

Research Problem :

Football is one of the most popular and most popular games in the world because it has a high level of popularity around the world, so the players do a difficult job during the game subject to great responsibility in performing their duties during the game and providing a level that qualifies them to achieve victory and high achievement, the distinctiveness of the game of football with a fast pace and continuous maneuvers throughout the game requires players to bear the burden of following, observing, distributing duties and taking the appropriate place within the field of play and during the course of the game.

Based on the above, the researcher identified the importance of her research in her attempt to explain the relationship between intentional control and its relationship with mental skills of elite soccer players.

Which requires the player to possess psychological and mental characteristics, including his attention control and mental skills, which qualifies him to perform the game with the best performance and image.

The player's ability to control his attention and his sound mental ability is the most important base for the game of football and without it, the player cannot fully implement his plans and duties, as it depends on the extent of the player's psychological preparation, and from here there must be some specific levels of attention and mental skills that help the player to behave properly, and in fact we see that most of our players suffer from poor psychological preparation and lack of interest in scientific knowledge by their coaches and supervisors because most of their coaches focus on the physical and skill aspect without any consideration and importance for that aspect, and because the researcher is an academic specialized in learning methods and wedge.

Research Objectives :

1. Identify the intentional control and its relationship with the mental skills of the players of the elite clubs provided elite teams in Baghdad Governorate for the football season (2023/2024).
2. Identify the correlation relationships between intentional control and mental skills of players of elite clubs in the city of Baghdad (2023/2024).

Fields of Research:

1. Human domain: Elite soccer clubs in the city of Baghdad.
2. Temporal domain: The period from 20/3/2024 to 20/5/2024.
3. Spatial domain: Stadiums of elite clubs in the city of Baghdad.

Defining the Terms of the Study:

1. Attention Control:

Posnor defines it as "a highly organized and planned mental process designed to help the individual select meaningful stimuli and avoid and neglect disorganized and interrelated stimuli" [1].

2. Mental Skills :

It is defined (Mental Skills) "are processes for organizing and arranging chains and adaptations of cognitive processes and for developing them through continuous training on them and the goal of obtaining optimal results for high performance" [2].

2. Materials and Methods

Research Methodology:

The current research issue required the researcher to adopt the descriptive research method, which is defined as “a method that describes a specific phenomenon according to research plans that include accurately describing the phenomenon, collecting facts and information about it, conducting an evaluation of the phenomenon to be studied for what it should be, and in light of the criteria, and proposing principles and steps that it should be” [3].

Also, achieving the objectives of this study imposed on the researcher to adopt the correlational method, and this method is defined as “a type of research that can discover the existence of correlational relationships between two or more variables, and then know the strength and direction of that relationship” [4].

Research population and sample:

The current research population included players of the Iraqi Premier League from the city of Baghdad for the year (2023/2024), and the total research population amounted to (202) players who were deliberately selected, and the researcher selected her sample consisting of (170) players randomly selected to represent the main research sample, so that the percentage of the research sample is (86, 44%), which is within the percentage of the total representation of the research community, after excluding (15) players from the players of the teams (Al-Zawraa, Talaba, Oil) because they represented the exploratory research sample, as well as (17) players were excluded for lack of readiness and attendance as shown in Table 1.

Table 1. Shows the Clubs of the Middle Euphrates Region, the Number of Players and the Percentages.

Percentage	Exclude d players	Trial Players	Basic Trial Players	Total number of players	club	t
%78,26	3	-	24	27	Air Force	1
%79,16	3	-	24	27	Police	2
%87,5	1	5	20	26	Alzora	3
%91,66	2	5	17	24	Students	4
%78,26	2	5	16	23	oil	5
%79,16	2	-	22	24	Border	6
%87,5	2	-	24	26	Karkh	7
%91,66	2	-	23	25	Baghdad Municipality	8
%86,44	17	15	170	202	Total	

Instruments and tools used in the current research:

((Psychological resources - psychological measurements and tests - questionnaires - ballpoint pens - hb computer - electronic stopwatches (4) - data dump forms - electronic calculator)

Psychometric measures and tests used :

1. Determination of research measures:

1.1 Attention Control Scale:

The researcher used the scale prepared by (Ismail, 2022) and applied to athletes (Appendix 1), consisting of (30) paragraphs and five alternatives to answer (always - often - sometimes - a little - never) and degrees (1 - 5 - 4 - 3 - 2) respectively, while the negative scores are calculated in reverse, and the highest score of the scale reached (170) and the lowest score (32), while the hypothetical mean of the scale reached (158).

1.2 Mental Skills Scale:

The researcher used the scale designed by (Bell, Benson, Shambrook, 1996) to measure some aspects (mental - psychological) important for sports performance

translated and modified by (Allawi). The questionnaire includes (24) statements (Appendix 2), and each of the six dimensions is represented by (4) statements, and the player answers the statements according to a six-degree scale (very much applies, very much applies, medium applies, little applies, very little applies, not at all applies).

- a. are positive statements in the dimensional direction, except for statement (13), which is negative in the opposite direction of the dimension and included the following statements:
- b. (20,14,8,2), which are positive in the dimension direction, except for statement (8), which is negative in the opposite direction of the dimension.
- c. Statements of the ability to cope with anxiety are: (22,16,10,4), which are positive in the dimension direction.
- d. Self-confidence statements are: (23,17,11,5) and statements (17,5) are positive in the direction of the dimension, while statements (23,11) are negative in the direction of the dimension.
- e. The achievement motivation statements are: (21,15,9,5) and all of them are negative in the direction of the dimension.

When correcting the scale, the scores in the direction of the dimension are given according to the score that the player set for himself in front of each positive statement, while with negative statements, the scores that the player set for himself are reversed.

2. Conducting an exploratory trial of the two scales:

To identify the clarity of the instructions, paragraphs and answer alternatives by the sample and to determine the necessary time to know the most important difficulties that the researcher may face during the application of the two scales in their final version, the researcher presented and applied her measures to a sample of (15) players that she chose randomly and by lottery and they are elite players from the clubs (Al-Zawraa, Talaba, Oil) at 3 pm on successive days (25 / 26 / 27 / 3 / 2024) in their stadiums (Al-Zawraa, Talaba, Oil), It was found that the instructions were clear by the sample and the time taken to apply them was between (15-20) d. Either the alternatives were very suitable for the level of the players as well as the paragraphs and thus the two scales with their instructions, paragraphs and answer alternatives were ready to be applied to the original sample of the research.

3. Final application of the two scales:

After completing all the necessary requirements for the two scales (attention control and mental skills), the final application was applied to the research sample of (170) players from eight clubs, namely ((Air Force - Police - Zawraa - Students - Oil - Border - Karkh - Amanat Baghdad)). On Monday (1/4/2024) until Tuesday (9/4/2024), the questionnaire was distributed to the players in their stadiums so that they sit within a specific distance from each other to avoid influencing the answers, and the time for players to answer the questionnaires for the two scales amounted to (15- 20) D and then collected the responses of all the testers))

Statistical Methods:

A statistical package (SPSS) version (25) was used to process the research results.

3. Results

The researcher used statistical methods to fill the results obtained through the application of the two scales, and for the purpose of achieving its objectives and verifying the validity of its hypothesis, the research results were presented, analyzed and discussed in order to identify the most important differences and statistical significance according to a precise and clear scientific perspective.

Presentation and Analysis of the Results of the Level of Attention Control and Mental Skills of the Research Sample :

Table 2. The Statistical Description of the Research Sample on the Attention Control and Mental Skills Scale.

Torsion Coefficient	Standard Error	Standard Deviation	Calculation Center	Variable	t
0,774	0,889	6,885	137,44	Attentional control	1
0,470-	0,744	4,448	48,890	Mental skills	2

Table 2, shows that the arithmetic mean, standard deviation and standard error of the research sample, where the arithmetic mean of attention control (137.44) with a standard deviation (6.885) and standard error (0.889), and the standard error (0.889), and the coefficient of skewness was (0.774), while the mental skills variable reached its arithmetic mean (48.890) and its standard deviation (4.448) and standard error (0.744), and the skewness factor was (-0.470).

Table 3. Arithmetic mean, Standard Deviation, Hypothesized mean, Calculated and Tabulated t-value for the Two Scales.

Significance	T-Table	T-calculated	Calculation center	Standard deviation	Calculation center	Variable	t
moral	1,69	11,813	108	5,477	141,45	Attentional control	1
moral	1,69	23.255	40	4,133	48,890	Mental skills	2

Table 3, shows that the arithmetic mean of the attentional control scale for the research sample amounted to (141.45), which is greater than its hypothetical mean of (108), and when using a one-sample t-test between the two means, we found that the T value amounted to (11.813), which is greater than the tabular T value of (1.69) at the significant level (0.05) with a degree of freedom (168), which shows us that elite soccer players have a high level of attentional control.

The arithmetic mean of the mental skills scale for the research sample amounted to (48.890), which is greater than its hypothetical mean of (40), and when using a one-sample t-test between the two means, the t-value amounted to (23.255), which is higher than the tabular t-value of (1.69) at the significant level (0.05) and the degree of freedom (168), which shows us that players from elite football teams are characterized by a high level of mental skills.

Presentation of the Analysis of the Results of the Correlation Between Attentional Control and Mental Skills:

Table 4. The Correlation Coefficient, Calculated and Tabular Value of the Research Variables.

Significance	T-Table	T-calculated	Standard Deviation	Calculation Center	Variable	t
moral	1,69	11,448	0,98	170	Attentional control	1
					Mental skills	2

at the 0.05 Significance Level and Degree of Freedom 168

From looking at table (4), the results showed us that the correlation coefficient amounted to (0.98), and when using the t-test for the significance of the correlation, we can see that the calculated t-value amounted to (11.448), which is greater than the tabular t-value, which amounted to (1.69) at the significant level (0.05) and the degree of freedom (168).

4. Discussion

From the results of Table 4, which included the arithmetic means, standard deviations and hypothesis means of the two research scales (attention control - mental skills), it is clear that the research sample possesses a high level of attention control and mental skills, which is reflected in the speed in making the most important decisions in a positive way in terms of minimizing playing errors and issuing important decisions during the performance of the game, as one of the tasks of the player inside the stadium to face the pressures of the game that affect their cognitive, psychological, motor, physical, skillful and physiological performance as well as how to deal with the proceedings in matches during the progress or loss of the result, "as it requires players to have high and multiple abilities in order to integrate performance and raise the high level because the game of football requires with modern development imposes many requirements and things from the players" [5]. Their efforts and performance are the key to achieving the required level during the match "and since sport in general requires motor, physical and skill activity, this activity leads to many emotional and cognitive responses of those who perform the game during play." [6].

The researcher attributes that the nature of the players' performance requires them to be alert and attentive to everything that happens around them and that continuing to perform matches at a high level requires possessing these qualities because a player who has attentional control has the ability to notice the weakness of the opposing team and notice the mistake before it happens.

The results of the research were logical and consistent with some sources that indicated that the specificity of the game of football as a team game characterized by many open skills as well as an example of team play, whether in offensive or defensive situations, and thus the practice of playing football requires the synergy of many skills of the mind that are involved in mental thinking as it indicates that "plans in the game of football that require more methods and means that require players to use their intelligence and thinking in their defense and attack plans and in all their actions inside the field" [7].

Emphasize that "the basic skills of the mind (mind visualization - relaxation - attention - control of tension - control of psychological energy) have interrelated relationships and correlations between them, as the development of one of them helps in developing the rest of the skills [8]. and this explains that all mental skills have obtained a high percentage of contribution to the player's overall performance.

Therefore, the researcher attributes these results to the fact that the current research sample are elite players, that is, players who have years of training and long playing practices so that these practices and continuous play in their clubs have gained them a long experience that undoubtedly worked to develop their mental abilities and then this will be reflected on their outstanding performance as "the acquisition of the ability to perform high and distinctive performance depends on what the player possesses and enjoys information and performance art in movements and motor experiences that the player acquired during the processes associated with continuous learning and training where the player used abilities and abilities in his attempt to provide enjoyable performance of what he enjoys.

5. Conclusion

Players from elite soccer teams possess a high degree of attentional control and mental skills, with a significant positive correlation between the two. These findings suggest that enhancing attentional control may further improve the mental skills essential for elite football performance. Further research is recommended to explore the underlying mechanisms of this relationship and to investigate the effectiveness of specific training interventions aimed at boosting attentional control to enhance overall athletic performance.

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Article

Psychological Empowerment Strategies among Mothers of Autistic Children

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Abstract: The current research aimed to identify psychological empowerment strategies among mothers of autistic children. The current research identified mothers of autistic children in the city of Baghdad whose children with autism are present in the institutes and centers of autism as (Baghdad Autism Center, Al-Nahal Institute for Autism Care, Rami Institute for Autism, and Basma Amal Center for Autism). The number of them is (130) mothers of autistic children for the academic year 2022-2023, for the purpose of verifying the goal of the research, the researcher built a measurement of psychological empowerment strategies. Considering the definition, provided by the researcher for the item "psychological empowerment strategies", four strategies for psychological empowerment were identified, and these strategies are: 1- Proper thinking. 2- Dialogue skills. 3-Emotion control. 4- Decision making. The measurement may consist of (38) items. The researcher also extracted the validity and reliability of the measurement, and after applying the measurement to members of the research sample, the data was analyzed and processed statistically using the statistical program (SPSS). The research reached to the following results: 1- There are no significant differences in the strategy of proper thinking; 2- There are no significant differences in the strategy of dialogue skills; 3- There are no significant differences in the strategy of emotion control; 4-There are no significant differences in the strategy of decision-making.

Keywords: psychological empowerment strategies, autism, mothers of autistic children

1. Introduction

Research problem

Psychological empowerment is one of the modern concepts that raises people to advanced levels.

Basic self-empowerment is about giving the individual freedom to perform, participation, more responsibility, and greater awareness of performance. Psychological empowerment refers to the recognition of the individual's right to freedom and control, and this is something that a person possesses because of his independent will and experience, and what contributes to clarifying the importance of psychological empowerment further is that empowerment gives the individual a more appropriate responsibility to do what he is responsible for. (Randolph & 118): 2002. Sashkin).

And we find that the starting point for making changes that help individuals achieve psychological empowerment is understanding the difference between positive thinking and negative thinking, between a positive tendency towards life and expecting the best, and a negative tendency and expecting that there is no hope in the future. And he should know that all the success that befalls an individual and the tasks he undertakes depends on the extent to which he feels optimistic and encourages a more optimistic point of view.

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Therefore, enabling a positive tendency reinforces the individual's ability to learn, understand and succeed in various concepts and skills and master success, and supports him further with the concept of developing a positive concept of himself, providing him with a bright life in the face of challenges and difficulties with the energy and passion that he already has, without increase or decrease. It also helps him to develop the concept of acceptance and appreciation, and to respect the failures and successes that he experiences as an experience that he can benefit from in later times, and to learn from his failure or success and take a lesson from it so that it becomes a form of feedback that helps him feel psychologically empowered, which in turn needs long-term components of the positivity relationship, confidence, and feelings of self-efficacy. (Dreher, 1995: 55).

Autism spectrum disorder is considered one of the most complex developmental disorders for parents and all members of the family. The reason for this difficulty is the ambiguity of this disorder and the strange behavioral patterns that these children show it, which may coincide with some other disorders, which makes parents constantly confused and difficult for them to understand. The child needs constant monitoring and supervision by the family, especially the mother, which increases the burden on her and increases the sense of responsibility towards their children. Thus, the mother is in a constant state of worry about her children and their future, which sometimes leads her to despair and feel helpless, and in many cases, they begin to blame themselves, mothers of children with autism spectrum disorders suffer from symptoms of depression, in addition to feelings of loneliness, hyperactive effort, and sometimes a feeling of worthlessness, they suffer from a great deal of worried, sadness, and helplessness towards the future, and the mother considers her child's injury a tragedy because she is unable to deal with it because of the social view she faces and the social distance towards her because of her children. Therefore, many mothers suffer from feelings of isolation and exclusion from social activities because of the stigma surrounding the eggs of children with autism spectrum disorder. (Amer, 2008:3).

From the above, the problem of the current research becomes clear by answering the following question: What are the psychological empowerment strategies for mothers of autistic children?

The importance of research

Women's empowerment is the path to achieving equality for women. Psychological empowerment is required for women's self-dependence, unless women become mentally and emotionally strong, they will certainly not be able to overcome the barriers that stand in the way of their empowerment. Psychologically empowered women live according to a different set of basic beliefs that guide their daily decisions and habits. These abilities enable them to carry difficulties at home or at work due to high self-appreciation. Thus, women's psychological empowerment is like a magic pill that nourishes the roots of different possibilities. Psychological development also illuminates women's minds, which helps women think, make decisions, and work for themselves, and serve as an independent, supportive column of society. Women's psychological empowerment includes strategies such as self-respect, flexibility, self-appreciation, decision-making ability, and emotional control, which directly or indirectly affect women's psychological well-being (Singh, 2022:3).

Autism is one of the disorders of comprehensive growth which is considered one of the most annoying and confusing childhood problems because it includes disorders in aspects of psychological performance during childhood, which may extend to include other age stages, including attention, perception, learning, and language, communication skills, sensory and motor skills, and all that reflects negatively on everyone who deals with these children, including families, teachers, specialists, and their peers (Al-Tamimi and Nasser, 2017: 13-55).

Mothers of autistic children usually face some unique challenges due to the general behaviors that their child exhibits, such as tantrums or misbehavior in public places. The mothers' reactions are unpleasant because of the reactions of others, as caring for a child with autism disorder a difficult process that results in huge pressure on the mother because people's recognition of children with autism disorder is completely different from other disorders because these children suffer from abnormalities that indicate the nature of their disorder, so they give them different names, and the behaviors of these children may sometimes be violent and illogical, which makes mothers of autistic children feel feelings of fear, disgust, discomfort, and sometimes weak self-confidence (Sydeny, 2016:499).

Oladipo (2009) argues that when people are psychologically empowered, there will be a change in attitudes, perception and behaviour, which will certainly lead to a positive change in value tendency, the ability to postpone gratification of one's desires, self-improvement, respect, self-efficacy and self-awareness as well as better mental health which will crowned in a peaceful and developed society (Singh, 2022:3).

There are many psychological obstacles that form an obstacle to women's empowerment. Some of these psychological barriers are dread, insecurity, risks, lack of self-respect, self-confidence, fear of failure etc. In some organizations, the lack of information, the lack of independence in decision-making, and the lack of independence in performing tasks are the greatest obstacle to women's psychological empowerment and role ambiguity, and work pressures are the main contributor as an obstacle to women's psychological empowerment (Singh, 2022: 3).

Menon (2001) believes that empowerment includes three psychological aspects: perceived control over one's environment, perceived competence in accomplishing tasks, in addition to participation in goals and based on these three major psychological aspects, psychological empowerment is a cognitive state characterized by a sense of control and perceived competence. Therefore, empowerment is considered a multifaceted concept that reflects the different dimensions of making an individual psychologically capable, or the extent of the individual's control over his sources of strength. Hence, empowerment is linked to rehabilitation that aims to help an individual who suffers from a physical, mental, or sensory handicap or disability to reach the maximum possible range from performance in the tasks he performs on a personal level, or the tasks he performs as a member of an institution or the community in which he lives." (Kavafi, Salem, 2008, 845).

Psychological empowerment is considered one of the psychological characteristics of individuals, which indicates increased personal strength such as self-efficacy and self-control (Perry, 2013:12). In this case, it can also be viewed as a psychological feeling or psychological experience, and empowerment as a psychological feeling related to... The person realizes his ability to do the things he wants to do and that he has the right to decide important issues in his life. As for empowerment as an experience, it refers to the actual ability of an individual or group to bring about change. In this way, empowerment also refers to the ability to make a decision and implement it through available resources (Patterson, 2013: 43). Some psychologists believe that individuals cannot be empowered unless they empower themselves by themselves, while others believe that the feeling of psychological empowerment can be reinforced and developed among individuals. Therefore, the concept of psychological empowerment is one of the terms of positive psychology that can be developed among individuals in various fields (Mustafa Taha, 2015: 15).

A woman who feels psychologically empowered believes that she can adapt appropriately to the events, pressures, situations, and people she faces. Empowerment as a constructivist concept includes belief in the power inherent within the individual, and power or empowerment from a motivational view refers to the internal need for free will or belief in the individual's self-efficacy, under this concept, power has its own rule within the framework of the defensive position of the active people and has a strategy and technique that strengthens the need for free will or belief in self-competence among people will make them feel more powerful and empowered. otherwise, any strategy that weakens the need for self-affirmation or belief in self-competence among people will increases feelings of lack of strength and empowerment.

Also empowering women at work or at home appears to have a great effect, as it is linked between women's feeling of empowerment and their general feeling of well-being, to achieve this, the government must work to achieve empowerment, which would increase the rates of women's mental health, and then require creating a family environment in which appropriate conditions to achieve mental health for children as well (Abdel Fattah, 2022: 49).

From the above, the importance of the current research becomes clear through:

1. The rarity of previous studies on psychological empowerment among mothers of autistic children, as far as the researcher knows.
2. The importance of a sample of mothers of autistic children in determining their psychological state and the psychological pressures, conflicts, diseases, anxiety, fear, and lack of self-confidence they suffer from, and the effect of this on their psychological empowerment.
3. There is no study that addressed psychological empowerment strategies among mothers of autistic children, to the researcher's knowledge.

The research goal

The current research aims to identify psychological empowerment strategies among mothers of children with autism.

Limits of research

The current research is limited and focus on mothers of autistic children in the city of Baghdad whose autistic children are present in autism institutes and centers (Baghdad Autism Center, Al-Nahal Institute for Autism Care, Rami Institute for Autism, and Basma Amal Center for Autism) for the academic year 2022-2023.

Definition of terms

Psychological empowerment

Rinehart & Short (1992) defined it as "the individual's beliefs and sense of independence in performing daily work tasks, the ability to suppose professional responsibility, a sense of importance, self-efficacy, influence on users who will benefit, and the ability to make the right decisions" (Abdel Fattah, 2017: 411).

Spreitzer (1995) defines it as "the individual's awareness that his work has meaning and useful, that he possesses the competence and ability necessary to accomplish the tasks, and that he possesses belief in himself and his ability to choose and organize the task that he must accomplish" (Spreitzer, 1995: 1442).

Brancato (2000) defines it as "an individual's beliefs about his abilities to carry out a job well, which is a means of encouraging the individual to make decisions, enriching experience and his sense of self-determination, and independence in influencing results, and that he is less afraid and has the ability to control and lead his external environment." It makes them more creative by trying what is new" (Abdel Fattah, 2017: 411).

The researcher relied on this definition (Spreitzer 1995) because she adopted the theory.

The Strategies for psychological empowerment

The researcher defines strategies of psychological empowerment as (a group of procedures used by mothers of autistic children to help them gain psychological empowerment, including proper thinking, dialogue skills, emotion control, decision making).

While the procedural definition is the score that mothers of autistic children obtained on each of the psychological empowerment strategies on the measurement prepared in the current research.

Autism

Kanner (1943) defines it as “a disorder that emerges from birth and affects communication with others and language and is characterized by routine and resistance to change” (Theeb, 2004, 1).

As defined by the American Diagnostic Psychiatric Society (DSM-V) it is: “a developmental disability characterized by being chronic and intense, appearing in the first three years of life, and which is the result of a neurological disorder that negatively affects brain functions” (A.P.A., 2000).

The researcher relied on the definition of the American Psychiatric Association (DSM-V).

Mothers of autistic children

The researcher defines mothers of autistic children as (mothers who have a child with autism spectrum disorder who is getting treatment in one of the governmental centers and institutes for autism and who suffers from weakness in his abilities and difficulty in social interaction and communication with others, she also faces a lot of pressures and challenges because of her child’s behavior).

An overview of psychological empowerment

The concept of empowerment is a recent concept, as it had no previous versions, and it began to appear in the 1990s, when the term psychological empowerment appeared in the work of Spreitzer (1995). Empowerment means feeling capable of influencing others and feeling effective, which gives the individual the freedom to determine his fate independently and determine his life path freely and without restrictions.

Psychological empowerment is defined here as the extent to which an individual can employ and develop his abilities, preparations, and possibilities that make him able to control and make appropriate decisions in different life situations. Psychological empowerment also includes three aspects: the psychology of control in the individual’s environment and perceived competence in achieving tasks, in addition to understanding the goal and based on these three main psychological aspects, psychological empowerment is a cognitive case characterized by a feeling of control, competence, and meditation. The importance of psychological empowerment is highlighted through support the efficiency and motivation of individuals, which in turn extends to the completion of the tasks assigned to them. Therefore, the process of psychological empowerment seeks to develop working individuals who can lead themselves through independence in thinking (Hammad and others., 2014: 45).

The concept of psychological empowerment is a multidimensional concept that includes motivation, self-efficacy, and a sense of responsibility, it creates in the person a feeling of control over his social environment and reinforces his ability to make his own decisions to become an effective member of society in general and his life in particular. (Hasan, 2021: 41). Psychological empowerment cannot be dealt with far away from the individual and analytical level, and it cannot be separated from the social and political factors and contexts in which the individual lives. It is not a subject private to the individual alone, but rather relates to the individual and how he should understand the social and political environment where he lives, how he learns to control the factors surrounding him, and how he is affected and influenced by others and factors. Therefore, it is wrong to explain psychological empowerment as an individual tendency or phenomenon possessed by some individuals and not others (Mustafa and Taha, 2015: 22).

Psychological empowerment, from the point of view of Tingland (2008): is the level of ability that an individual possesses to control his life, and this can be noted through six main indicators:

- Health: is the ability to control conditions that affect the mental and physical health of the person.

- Housing: This includes choosing the place and type of residence.
- Work: This includes obtaining qualifications, choosing, and obtaining work, and thus getting enough income to achieve a good standard of living.
- Close relationships: Includes options for establishing a family and forming social relationships.
- Free time: in terms of its quantity, content, and how to benefit from it.
- Values: related to the values an individual believes in, and how to apply them in life (Tengland, 2008: 80).

Theories that dealt with psychological empowerment

Sprietzer 's theory

This theory sees psychological empowerment as consisting of three points:

Firstly: Psychological empowerment is a personal phenomenon through which individuals take responsibility for doing their work. It is a group of psychological conditions that demonstrate the way an individual realizes his duties and the extent of his belief in his role in the institution or society, which gives individuals self-confidence and makes them desire to succeed at work, in an institution, or at home. Empowerment means that individuals should understand their duties before they are told what to do in a complete way. It is a person's ability to make decisions independently and use available resources to achieve the necessary goals.

This theory believes that empowerment is not basically a personality characteristic that can be generalized through situations, but rather a collection of perceptions shaped by the environment. Therefore, empowerment reflects what people feel from continuing instability state in their perceptions of themselves in relation to their environment.

Sprietzer (1995) believes that whenever the individual's control increases and become more controller in all activities of his life, this indicates a high level of psychological empowerment, and whenever the individual's control decreases in his life activities, this indicates the level of psychological empowerment become lower. In addition, Tangland's vision explains that the indicators of psychological empowerment appear in all activities of human life, of which work represents only one field.

Secondly: Empowerment is constantly changing, as people can be viewed as less or more empowered, that is, all people have psychological empowerment to varying degrees, and are either fully empowered or not fully empowered.

Thirdly: Empowerment is not a comprehensive construct that can be generalized to different life situations and roles, but rather it is specific to the individual's field as well. This theory believes that there are two factors that precede the condition of psychological empowerment, which are self- appreciation and the individual's position of control because it is what shapes how individuals see themselves in relation to their work environments. This theory also assumes that the context of the environment can influence on sense of an individual in empowerment and self-respect, which is defined as a general feeling of self- appreciation associated with empowerment and is probably to be distributed among individuals those with high self-respect include a sense of self-worth and a sense of competence, and through self-appreciation for individuals who consider themselves have a value resources with talents deserve contributing, they are probably to take an active approach to their own selves, but on the other hand, Individuals who have a low feeling of self- appreciation are improbably to take this feel. The theory also indicates that information and rewards are of great importance in facilitating reach to a state of psychological empowerment among individuals, as information about duties can be important for empowerment because it helps to create a sense of meaning and importance and reinforce the individual's ability to make decisions and influence them in a way that is well consistent with the goals of the organization or society and his message. Regarding performance-related information, individuals need to understand how well they are performing to make and influence decisions to maintain performance and improve basic performance

information in the future to reinforce a sense of competence and the belief that teams are an important part of society (Lahlouh Belkhiri, 2022: 33-34).

Pattern (1990) Thomes & Velthouse

Thomes & Velthouse built the cognitive-psychological empowerment pattern and defined empowerment as an increase in motivation for internal tasks, which includes the general conditions of the individual that are directly related to the task he performs, which in turn produces satisfaction and motivation, they pointed out that empowerment must start from the self.

System of belief includes how person can see the outside world and self-concept, which encourages purposeful behaviors and connects them to the goals of empowerment approaches applied in society.

Researchers have identified four psychological dimensions of empowerment, which represent the basis for psychological empowerment, as follows:

Firstly: Sensory-cognitive influence refers to the extent of awareness that a person can make a difference in achieving goals or completing missions, and this in role leads to creating the required effect in the individual's environment. This influence is evaluated through the belief that an individual has affected the work of others as well as the decisions taken, and this influence can have multiple effects at different levels. (Abu Asaad, 2017: 155-156).

Secondly: Competence means to what degree an individual can perform these activities with high skill. Competent individuals feel that they find the duties they perform and know well that they can perform those duties well. Competence is an individual's sense of achievement in performing the activities and tasks he has chosen in skillfully way, and feeling of competence includes a feeling of good performance and quality in performing duties.

Thirdly: Giving a meaning to the effort: It means giving attention to the value of work or missions as judged through the standards and ideas of individual. Giving meaning to work involves comparing between requirements role of work and beliefs. The individual, for example, believes that the tasks he performs have value. Giving meaning to work means that a person feels that he has the chance to participate in the noble cause. A sense of meaning in work represents the belief that a person is following a path deserves effort and time, and that a person is performing a valuable message.

Finally: Choice includes the responsibility that leads to a person's behaviors, as the individual feels that he chooses duties that are useful to him, and he does it in the way that seems appropriate. This sense of choice gives the person a sense of freedom in their choice and makes them believe that they can use their personal judgment and behave in accordance with his understanding of the duty which he does (Abu Asaad, 2017: 155-156).

Previous studies/Studies that dealt with psychological empowerment

Arabic Studies

Al-Azzawi's study (2022) The study aimed to construct a measure of psychological empowerment, and to know the level of empowerment according to the variables of gender and experience. The study was conducted on a sample male and female teachers at secondary school, and the measure consists of (35) items, divided into four dimensions: (meaning, competence, independence, freedom of choice, and effect), and was answered according to the rating measure consists of five degrees. The factors of validity and reliability were extracted, and the results showed that secondary school teachers have well psychological empowerment, and that male teachers recorded higher levels of psychological empowerment than female teachers, and the experience variable had the greatest impact in recording a higher level of psychological empowerment (Al-Azzawi, 2022: 323-354).

Amer study (2022)

- The study aims to identify the extent of psychological empowerment among kindergarten female teachers.
- Are there statistically significant differences in the extent of psychological empowerment according to the variable of years of service?
- Are there statistically significant differences in the extent of psychological empowerment among kindergarten female teachers (whether they are married or not)?

The current research was based on kindergarten female teachers belonged to the Directorate of Baghdad Education in the Karkh and Rusafa areas for the academic year (2021-2022), and the sample included (400) teachers who were selected in a simple and random way. To achieve the research objectives, the researcher prepared a measurement to evaluate psychological empowerment consisting of (30) items covering the four areas (meaning, competence, freedom of choice, and effect), then the measurement was presented to experts in the field of kindergartens, educational and psychological sciences, and the researcher used validity indicators, including face and construct validity. The stability of the measurement was calculated using two methods to retest. After re-testing, it was found that the percentage of agreement was 0.85 and the Cronbach's alpha was 0.78. After applying the measurement to the sample, by using a statistics program (SPSS) the data was analyzed and treated statistically.

The research resulted in the following findings:

- Kindergarten female teachers enjoy psychological empowerment.
- There are statistically significant differences in psychological empowerment according to vary the years of service.
- There are no differences in psychological empowerment between married and unmarried kindergarten female teachers, based on the results, the researcher put forward several recommendations and proposals (Amer, 2022: 3-18).

Foreign Studies

Okyere study (2016) The study aimed to identify the four dimensions of psychological empowerment (meaning, competence, choice, and effect), in a sample contains six businesswomen from rural in Amharia-Otenebe, a village in region of the Greater Accra Rural in Ghana. The findings indicate that those rural women involved in entrepreneurial activities find their job more important and meaningful, it has also been reported that women have a remarkable level of competence to manage their businesses. In addition, the results showed that women enjoy a greater level of independence and freedom in managing their businesses. Moreover, these women enjoy control and the great effect on what happens in their work. The findings provide initial evidence that rural women engaged in entrepreneurial activities feel highly psychologically empowered (Okyireh, 2016:138-141).

Bozkul and Unsal study (2024) This study aims to develop and examine the effectiveness of a collective counseling program based on feminist therapy to empower women and reduce internal sex discrimination. The program was designed based on the point of view the awareness groups that have a fundamental place in women's movements. A semi-experimental design with a control group was used for pre-test and post-test. The study participants were 26 young women, with an average age of 22.50 ± 1.10 . The tools of data collection included the internal sexism measurement, the women's psychological empowerment measurement, and the personal information form. Analysis of variation was used to analyze the data. Results indicated a decrease in levels of internalized sexism and an increase in levels of psychological strength between participants. These findings are important for both mental health and gender studies and may contribute to future practices and research on psychological and educational interventions to reduce sexism among women (Binaz&Ünsal,2024:77-87).

Studies that dealt with mothers of children with autism

Al-Sahmah Study (2020) "The current study aimed to identify the nature of the relationship between self-compassion and patterns of emotional attachment and to discover the possibility of predicting self-compassion through patterns of emotional attachment. The study sample consisted of (360) fathers and mothers of children with autism spectrum disorder in the city of Riyadh. The researcher applied the following tools to them: the Self-Compassion measurement prepared by Neff (2003) and translated by Abdul Rahman and others (2015), and the Yarmouk measurement for adult attachment Styles prepared by Abu Ghazal and Jaradat (2009). The results of the study indicated the following: 1) The existence of a positive correlational relationship, statistically significant between the positive dimensions of self-compassion (compassion for the self, common humanity, mental alertness) and between secure attachment and anxious attachment, and the presence of a statistically significant negative correlation between mental alertness and avoidant attachment, and the absence of a statistically significant correlation between compassion and common humanity and avoidant attachment. There is a statistically significant negative correlation between the negative dimensions of self-compassion (self-judgment, isolation, and excessive empathy) and secure attachment, and there is a statistically significant positive correlation between the negative dimensions of self-compassion and anxious and avoidant attachment. There is also a positive correlation a statistically significant relationship between the total score of self-compassion and secure attachment, and there is a statistically significant negative correlation between the total score of self-compassion and anxious attachment and avoidant attachment. 2) The attachment style (secure, avoidant) contributes to predicting self-compassion, the attachment style (anxious, avoidant) contributes to predicting self-judgment, isolation, and excessive empathy, and the attachment style (secure, anxious) contributes to predicting common humanity and mental alertness, as well as Attachment styles (secure, anxious, and avoidant) contribute to predicting the overall degree of self-compassion. The results were discussed considering the theoretical framework and previous studies." (Al-Sahmah, 2020: 99-138).

Al-Araj Study (2021) "This study aimed to identify the level of social stigma and its relationship to worry about the future and social isolation between mothers of children with autism spectrum disorder in Ramallah and Al-Bireh Governorate. To achieve the objectives of the study, the descriptive, correlational approach was used, and three measures were used for the study: The social stigma measure and the future worry measure, and the social isolation measure was applied to a sample that included (101) mothers of children with autism spectrum disorder in Ramallah and Al-Bireh Governorate. The results showed that the level of social stigma was middle. The results also indicated that there were no statistically significant differences in social stigma according to the variables: the child's sex, the child's age, the mother's educational level, and social status, while the level of social stigma was middle. The differences were statistically significant in social stigma according to the variable of place of staying in favor of (the camp), and the results showed that the level of worry about the future was high. The results also indicated that there were no statistically significant differences in worry about the future according to the variables: the sex of the child, the age of the child, and the educational level of the mother and social status, while the level of worry about the future was middle. The differences were statistically significant in social isolation according to the child's age variable and in favor of (less than 7 years). The results showed a statistically significant correlation between social stigma and future worry between mothers of children with autism spectrum disorder, and the relationship was positive. That is, when the degree of social stigma was high, the level of worry about the future became high. It was also shown that there is a statistically significant relationship between worry about the future and social isolation of mothers, and the relationship was positive, meaning that the greater the degree of worry about the future, the greater the level of social isolation." (Al-Araj, 2021: 116).

2. Materials and Methods

The research community

The research community consisted of mothers of autistic children registered in government institutes for the academic year 2022-2023 in the city of Baghdad, and their total number was (2331), with (1787) males and (544) females.

The research sample

The number of individuals in the research sample was (130) mothers of autistic children. Four institutes and centers were chosen, and several mothers of autistic students were randomly selected from each institute. Table 1 shows this.

Table 1. Number of mothers of children with autism, distributed by institute

Sequence	Name of the institute or center	the total
.1	Baghdad Autism Center	33
.2	Al-Nahal Institute for Autism Care	35
.3	Rami Institute for Autism	36
.4	Basma Amal Center for Autism	26
the total		130

Search tool

Psychological empowerment strategies measure: The process of constructing the measure went through a series of the following stages:

1. Identify psychological empowerment strategies: to determine psychological empowerment strategies, the researcher placed a definition of psychological empowerment strategies, and considering the definition, four strategies for psychological empowerment were identified. These strategies are: - 1- proper thinking, which includes paragraphs (1-10) 2- Dialogue skills, which includes paragraphs (11-20). 3- Emotional control, which includes paragraphs (21-30). 4- Decision making, which includes paragraphs (31-38).
2. Formulating paragraphs: the items for the Psychological Empowerment Strategies measure were formulated and the items were distributed according to the areas of the measure, with (10) items for each strategy, and the number of items on the measure was (40) items, noting that the items are answered by mothers.

3. The Analysis of Statistical paragraphs:

Calculating discriminatory power: for the purpose of verifying the discriminating power of the paragraphs, a random sample of (210) mothers of children with autism were selected, and the arrangement of scores which obtained by the sample in descending order, that is, from the highest score to the lowest score. After that, the upper and lower 27% of the scores were chosen to represent the two extreme groups, the two groups included (112) mothers of autistic children, the researcher used the t-test for two independent samples to test the differences between the upper group and the lower group, for each item in the measure, the T value was considered an indicator for distinguishing each item by comparing it to the tabular value. All items were distinct at a level of significance (0.05) and with a degree of freedom (110), as the tabular value reached (1.960) except for two items (37, 39) and Table 2 explains that.

Table 2. T-values for the items of the Psychological Empowerment Strategies Scale using the two extreme samples method

Se q u	Upper group 27%		Lower group 27%		t- value	Conn otatio n level	Se q u	Upper group 27%		Lower group 27%		t- value	Conn otatio n
	Mean	s	Mean	s				Mean	level	Mean	s		
1	3.7500	.43693	2.6607	.69483	9.931	Mark	21	3.4107	.49642	2.1429	.81861	9.910	Mark
2	3.7321	.55567	2.8036	.64441	8.166	Mark	22	3.3929	.49281	2.2143	.86790	8.837	Mark
3	3.7321	.44685	2.5179	.80884	9.834	Mark	23	3.3750	.48850	2.1964	.88255	8.743	Mark
4	3.7321	.44685	2.6786	.74118	9.110	Mark	24	3.3571	.48349	2.1607	.91008	8.688	Mark
5	3.7143	.45584	2.5893	.78107	9.309	Mark	25	3.3393	.47775	2.1636	.91820	8.440	Mark
6	3.6786	.47125	2.5893	.70780	9.586	Mark	26	3.3214	.47125	2.2857	.98561	7.094	Mark
7	3.6429	.48349	2.6250	.70227	8.934	Mark	27	3.3036	.46396	2.2857	.98561	6.992	Mark
8	3.6071	.49281	2.3929	.70527	10.561	Mark	28	3.1964	.40089	2.0714	.96967	8.023	Mark
9	3.6071	.65167	2.7321	.67396	6.984	Mark	29	3.1607	.37059	2.0000	1.00905	8.080	Mark
10	3.5893	.65441	2.6964	.68542	7.051	Mark	30	3.1250	.33371	1.8929	.92792	9.350	Mark
11	3.5893	.49642	2.3571	.69879	10.757	Mark	31	3.1071	.31209	2.1964	.90292	7.134	Mark
12	3.5714	.70986	2.7679	.66033	6.203	Mark	32	3.1786	.71623	2.8929	.67900	2.166	Mark
13	3.5536	.50162	2.2679	.61765	12.092	Mark	33	3.0714	.68376	2.7679	.66033	2.390	Mark
14	3.5357	.50324	2.3214	.69038	10.636	Mark	34	3.0714	.25987	1.6786	.99283	10.156	Mark
15	3.5000	.50452	2.3393	.69483	10.115	Mark	35	3.0536	.22721	1.5536	.89279	12.185	Mark
16	3.4821	.50420	2.3750	.70227	9.583	Mark	36	2.9643	.46571	1.8750	.66230	10.068	Mark
17	3.4643	.50324	2.3750	.70227	9.435	Mark	37	2.8214	.47125	2.7321	.55567	0.917	Mark un
18	3.4464	.50162	2.3750	.70227	9.290	Mark	38	2.9464	.35263	1.4107	.78107	13.410	Mark
19	3.4464	.82945	2.7857	.65267	4.685	Mark	39	2.9107	.39436	2.8750	.63425	0.358	Mark un
20	3.4286	.49935	2.2857	.67995	10.138	Mark	40	2.9821	.30097	1.4821	.83101	12.700	Mark

The relationship of the paragraph to the total: the discrimination factor was used for the items of the Psychological Empowerment Strategies measure using the Pearson correlation equation between the individuals' scores on each item and their total scores on the measure for (210) questionnaires, which are the same questionnaires that were exposed to analysis using the two extreme samples method. It was found that all correlation factors were distinct when compared to the tabular correlation factor values, except two paragraphs (37, 39), and Table 3 shows this.

Table 3. The correlation value between each item of the Psychological Empowerment Strategies Scale and the total

Sequ	r value	Sequ	r value	Sequ	r value	Sequ	r value	Sequ	r value
1	0.75	9	0.89	17	0.48	25	0.67	33	0.49
2	0.70	10	0.97	18	0.75	26	0.49	34	0.70
3	0.39	11	0.96	19	0.59	27	0.61	35	0.76
4	0.47	12	0.78	20	0.66	28	0.50	36	0.47

5	0.82	13	0.57	21	0.40	29	0.54	37	0.09
6	0.42	14	0.98	22	0.52	30	0.61	38	0.64
7	0.34	15	0.78	23	0.47	31	0.76	39	0.04
8	0.88	16	0.56	24	0.84	32	0.80	40	0.67

Validity of the scale

After the items of the measure were formulated in its initial form, and after putting the instructions and alternatives, and for the purpose of identifying the obvious validity of the measurement, the researcher presented it (Appendix / 1) to a group of experts specialized in psychology. After the researcher explained to them the purpose of the study and presented the theoretical definition of the study variable and the items related to the measure, asking them to express their comments and opinions regarding the measurement. All items were accepted after getting an agreement rate of 80%, and thus all items were maintained.

Stability of the tool

Re-testing: The measure was applied to (60) mothers of children with autism, and the measure was re-applied after two weeks, as it is noted that the period between the two tests should not be long, as the period between the first and second tests should range between (10-20 days). The value of the correlation coefficient was (0.81).

Half division: In this method, paragraphs are divided into two halves. Each part consists of (19) paragraphs, the division was based on singles and evens paragraphs, after calculating the Pearson correlation factor between the two halves of the test, it was found to be (0.75), and since the extracted correlation factor was for half of the test, it was arranged using the Spearman-Brown equation, after that the reliability factor of the measure using this method was (0.86), and this value is considered acceptable compared to previous studies.

Correcting the measure: The researcher put a graded measure to answer the paragraphs, which is (it applies to it a lot, it applies to it sometimes, it applies to it a little, it does not apply to it). The weights of the alternatives were (4, 1, 2, 3), and the highest possible score on the measure was (152). The lowest possible score is (38) and the average theoretical score is (95).

Final application: After verifying the validity of the current research tool attached (1) and applying it to the selected research sample consisting of (130) mothers of autistic children. The researcher was careful to distribute the measure questionnaires under her supervision, and after the researcher made sure that the sample understood the measure instructions, she asked them to read them carefully and answer by choosing one of the alternatives freely, because their answers will not be seen by anyone except the researcher and that their answers will contribute to helping the researcher and scientific research.

Statistical Means: The researcher used the following statistical means:

1. One-sample T-test.
2. T-test for two independent samples.
3. Pearson's correlation factor.
4. Spearman-Brown equation.

3. Results and Discussion

Identify psychological empowerment strategies among mothers of autistic children.

The arithmetic means for the sample of mothers of autistic children and their number (130) on the strategy of avoiding stressful situations was (24.9385), which is less than the hypothesized mean for the tool, which was (25). It was found that the T value calculated after using the one-sample t-test was (0.185), which is not significant at the connotation

level (0.05) and degree of freedom (129), which indicates that mothers of children with autism have a lower ability to think properly, and Table 4 shows this.

Table 4. The t-test for the significance of the differences between the average scores of psychological empowerment strategies and the hypothesized average for the sample

Psychological Empowerment Strategies	Number	Arithmetic Mean	Standard Deviation	Hypothetic Mean	Calculated T-Value	Tabular T-Value	Significance Level	Degree of Freedom
Sound thinking	130	24,9385	3.78441	25	0.185	1.660	0.05	129
Dialogue skills	130	24,2538	4.88045	25	1,743	1.660	0.05	129
Emotion control	130	23.9154	6.86643	25	1.801	1.660	0.05	129
Make decision	130	19.9000	2.77545	20	0.411	1.660	0.05	129

And the arithmetic mean for the sample of mothers of autistic children (130) on the dialogue skills strategy is (24.2538) and it was found that the T value calculated after using the t-test for one sample is (1.743), which is not statistically significant at the connotation level (0.05) and the degree of freedom (129), which indicates that mothers of autistic children have decreased in dialogue skills, and Table 4 shows this.

The arithmetic mean for the sample of mothers of autistic children (130) on the emotion control strategy was (23.9154) and it was found that the T value calculated after using the t-test for one sample was (1.801), which is not statistically significant at the connotation level (0.05) and degree of freedom (129), which indicates that mothers of autistic children have a lower ability to control emotions, and Table (4) shows this.

The arithmetic mean for the sample of mothers of autistic children (130) on the decision-making strategy was (19.9000), and it was found that the T value calculated after using the t-test for one sample is (0.411), which is not statistically significant at the connotation level (0.05) and degree freedom (129), which indicates that mothers.

The results in Table 4 showed that there is no statistically significant difference in the sound thinking strategy among mothers of autistic children, and there is also no statistically significant difference in the dialogue skills strategy, the emotion control strategy, and the decision-making strategy among mothers of autistic children.

This result can be explained by the feeling of the mothers of autistic children of the burden of the roles required of them and the psychological pressures to which they are exposed, and this may sometimes make them feel a decreased ability to face the requirements of their children and the requirements of their autistic child.

Sprietzer (1995) believes that whenever the individual's control increases and become more controller in all activities of his life, this indicates a high level of psychological empowerment, and whenever the individual's control decreases in his life activities, this indicates the level of psychological empowerment become lower. In addition, Tangland's vision explains indicators of psychological empowerment appear in all activities of human life, of which work represents only one field.

4. Conclusion

Through the results of the current study, which were presented and discussed, the following conclusions can be get:

1. The decreased ability to think properly in mothers of autistic children may be due to the weakness of their energy to think properly due to the psychological pressures that the mother is exposed to because of her child with autism disorder.

2. Since the ability to think properly decreases among mothers of children with autism, it is natural that their ability to make decisions decreases, in addition to the lack of dialogue skills.
3. The decreased ability of mothers of autistic children to control emotions is due to the painful experiences that the mother is exposed to because of her child with autism disorder, which puts her in a state of constant anger and tension. When the mother faces psychological pressure, she may lose control of her feelings and it is difficult for her to control them.

5. Recommendation

Based on the results of the research, the researcher recommends the following:

1. Urging mothers to accept their children with autism spectrum disorder and not be ashamed of his behavior in front of others.
2. Increasing attention and care by government institutions towards mothers of children with autism, in particular and those with other disabilities in general and providing them with psychological care because their feelings and emotions change due to the difficulties that the mother faces with her child with autism or disability.
3. Exposing mothers to training and guidance sessions on educational methods for dealing with a child with autism in a way that does not put psychological pressure on them.

6. Suggestion

The researcher suggests the following:

1. Conducting studies aimed at identifying the relationship between psychological empowerment strategies and methods of dealing with stress among mothers of autistic children.
2. Conduct a study to identify the reasons for the decrease in psychological empowerment strategies among mothers of autistic children.
3. Conducting a study aimed at preparing a counseling program aimed at modifying psychological empowerment strategies for mothers of autistic children.
4. Conducting a study aimed at revealing psychological empowerment strategies among mothers of people with other disabilities (Down Syndrome, learning difficulties).

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Article

Formation of the Legal Framework of the Periodical Press of Uzbekistan (1991-2023)

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Abstract: From its beginnings during colonial control until the post-independence era, the article examines the development of the press in Uzbekistan. It draws attention to how important Tatar enlightenment was in founding the first press and how Jadid reformists influenced the use of media as a vehicle for a national awakening. The research fills in the information vacuum about the precise effects of these early works on the evolution of society. It uses historical examination of original materials, such as magazines and legislative documents, as part of its methodology. Tracing the evolution of Uzbekistan's press in terms of law and culture is the goal. Findings show a notable departure from Soviet and colonial rule.

Keywords: Uzbekistan, press, books, magazines, law, resolution, jadid, newspaper, city, information, printing, intelligentsia, colonial, Turkestan democalization, organization, news media

1. Introduction

The press is a set of all printed products, which in a narrow sense are periodicals. The press mainly represents newspapers and magazines (synonym – pressa). The press, as a sharp and influential tool of social consciousness, has a lasting and active influence on the Society of man, forms public opinion, is a powerful ideological factor in the absorption of certain views into public consciousness.

The press covers the life of society in various (socio-political, economic-production, scientific technical, etc.) directions. The press was formed in Europe in the middle of the 15th century, for almost the 5th century (until the emergence of other types of media – broadcasting and television) was considered the main means of interpersonal Mass Communication, the dissemination of knowledge and ideas.

In the 70s of the XIX century, the Press began to form on the territory of Uzbekistan. In Tashkent, the “Туркестанский ведомости” (“Turkestan Gazette”), an Uzbek language annex founded in 1870 by the colonial rulers of the country, is considered the first examples of the “Turkiston viloyatining gazeti” (“Newspaper of the Turkestan province”) press in Central Asia.¹

2. Materials and Literature Review

It is worth saying that the contribution of the tatar enlightenment is great in the emergence and development of timed press and printing works in Turkestan. In 1870, according to the Order of the Governor-General of Turkestan Konstantin Petrovich von Kaufmann,

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¹O'zbekiston milliy ensiklopediyasi Davlat ilmiy nashriyoti, 2003

the “Turkiston viloyatining gazeti” (“Gazetteer of the Turkestan province”) began to be published as an appendix to the newspaper “Туркестанский вестник” (“Turkestan Gazette”). Kaufman asked Petersburg to cite Muslim fonts for the publication of this newspaper [1]. This newspaper was originally written by tatar printers Shahimardon Ibrahimov and M. Chanishev was the editor. Tatar letter pickers Shahingirey Bekkulov, Abdulatif Yavushev, Ali Bektemirov worked [2]. While it promoted the colonial policies of the Russian Empire, it contributed to the development of the National Press and printing.

After that, from 1905-1907, the first progressive national newspapers began to operate in Turkestan. These, “Taraqqiy” (“Progressive”), “Tujur”, “Xurshid”, “Shuhrat” (“Fame”), etc. Their path was continued by the newspapers “Sadoi Turkiston”, “Sadoi Farg’ona”, “Najot” gazetalari, “Oyina”, published in the second decade of the 20th century. National publications promoted the ideas of turning Turkestan into a literate, enlightened, progressive, prosperous, independent land.

In June 1906, the first Uzbek national newspaper “Taraqqiy” (“Progressive”) began to be published. It was edited by Ismail Obidiy of tatar ethnicity. About this newspaper, Abdulhamid Chulpan writes in his article “Turkistonda matbuot” (“Press in Turkestan”), published in Baku: “Taraqqiy” (“Progressive”) was a progressive newspaper, the editor of which was Ismail Obidiy satellite from the inner Russian Tatars [2]. After the October Revolution, this man was divided into the Office of the doxilia commissioner, as opposed to the representative of the left socialist revolutionary faction. After two months, he was cut off from the side of the government” [3]. Colonialism and bigotry were condemned in this newspaper. Articles have been published urging Muslims to wake up, to gain knowledge of the nation. The reason for his anti-government comments was shut down. In 1907, “Shuhrat” (“Fame”) was published by Abdullah Avloni, and in 1908, “Asia” was published by Ahmadjan Bektemirov.

At the beginning of the 20th century, the influence of the Press on everyday life, people, society became strong. In this, it can be seen that the press has become a necessity for people to actively interfere in their social life and become boxed out of the world. Initially, the newspapers came out once a month bazor, because during this period there was a shortage of paper in the Turkestan territory. Gradually, weekly and daily publications began to rush among the people. In particular, the articles and information on its pages took on a spiritual need.

3. Results

In fact, the jadids raised the value of the press as the most fundamental factor in reforming the spirituality of the nation, in particular, enlightening young people, teaching them to look open to the world and instilling a grandiose thought. The press acted as the main source and internet for human beings, providing information about yesterday.

And under the jadids, the press was to be a wish, a servant on the way to the development of the nation and el-yurt, the sun of the consciousness of the people, a mirror on the conscience of everyone. When they were few, they achieved this. For example, the newspaper “Ulfat” became the voice of enlightenment and spirituality, literature and literature, and the publication of “Sado” became the voice of the unity of volunteers. The name of newspapers and magazines was chosen in accordance with these noble intentions.

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Turkestan intellectuals performed their school duties in Crimea – Boqchasaroy-until they themselves published a newspaper. In this, they knew the program of the ideas of Ismailbek Gasprinsky "Unity in Language, thought, work." The jadids followed his ideas by reading this enlightener's newspaper "Tarjimon" ("The Translator") (1883-1914).

After 1917, as in all allied republics within the former USSR, the Turkestan region was decided by a multi-disciplinary system of the Soviet press, a party of a new political orientation. The process of formation and development of the press, contrary to universal democratic rules, took place in the conditions of unipartianism – the absolute sole rule of the Communist Party. The image, direction of newspapers, magazines, books were determined on the instructions of the leadership of this ruling party.

4. Analysis

This process intensified especially after the seizure of power in Turkestan. The Bolsheviks began to organize various press publications to spread their socialist ideas. The Bolsheviks used these newspapers to escalate the class struggle in Turkestan. Articles were also published criticizing Islam. Even also published articles discrediting scarecrows who campaigned for the independence of the land. During the Soviet era, the Press served as the main tool in promoting the ideas of the comunistic system.

Since 1991, a completely new stage of democratic development in terms of quality has also begun in the development of the press of Uzbekistan. Now organizations, parties, associations, some communities, citizens also have the right to establish press publications. Freedom of the press in the country, the opportunity was created to ensure freedom. In order to create conditions for the normal functioning of the media, to solve financial and technical issues related to their publication and distribution, to provide practical assistance for the active participation of creators in the democratic process, the Social Fund for the democratization and support of the media of the Republic of Uzbekistan was established (August 30, 1996).

The foundation is an independent, self-governing, non-governmental organization of media representatives. The adoption of the law of the Republic of Uzbekistan "On publishing activities" (August 30, 1996), "On Media" (December 26, 1997), "On protection of journalistic activities" (April 24, 1997), "On guarantees and freedom of information" (April 24, 1997) played an important role in the development of the Uzbek press. The state press Committee of the Republic of Uzbekistan, which has been in general charge of the work of the press of Uzbekistan, was reorganized into the press and Information Agency of the Republic of Uzbekistan according to the decree of the president of the Republic of Uzbekistan "On improvement of Management in the field of press and Information" (July 3, 2002). In accordance with this, the press and Information Agency of the Republic of Karakalpakstan, the regional departments of press and information were formed under the regional authorities. This reform was a major step taken to oddin in the context of democratization and liberalization of the social life of the country in order to more fully meet the needs of the population of the Republic for information, to promote the widespread development of media, publishing works and printing, to form a modern market for information services.

5. Discussion

Press products of Uzbekistan (printed publications) are divided into periodicals and non-periodicals. Periodicals include newspapers, magazines, magazine-type publications (bulletins, scientific papers, etc.), non-periodicals include books, pamphlets, printed products, etc. These, in turn, are of several types – general and specialized. According to the institution – newspapers of government agencies, people's movements, parties, associations, foundations, commercial, religious organizations, etc. Depending on the regional direction – there will be a central (nationwide), regional, city, district, Lower Press bodies (see multi-circulation newspaper). In the conditions of a market economy, advertising,

commercial, private newspapers appeared magazines in essence, socio-political and socio-economic, literary-artistic, natural-scientific, agricultural, etc. Depending on the direction – divided into children, young people, women, etc. According to the establishment – government agencies, non-governmental organizations, private magazines are also coming out. Book products are divided according to their purpose – mass literature, political literature, fiction, scientific literature, scientific-mass literature, textbook, reference literature, etc. Based on the demands of the market economy in the country, a system of publishing houses appeared, which were necessary for the general public, publishing shopping books (see again publishing). On June 27, 1906, “Taraqqiy” (“Progressive”) was the 1st issue of the paper. From this date (June 27), it is celebrated as press and Media Staff day in Uzbekistan (since 1993). Issues related to the press of Uzbekistan are mainly covered in the magazine “Press of Uzbekistan”. For example, according to the state statistics committee, by January 1, 2021, the number of subscribers connected to the internet was almost 20 million. This figure increased by 21.9 percent compared to the corresponding period last year.

In print publication data from 2000 to 2020, the issue of magazines and other timed editions was 195 in 2019, down to 175 in 2020. Newspaper circulation, however, decreased from 460 to 94 in 2019 to 366 in 2020. Our President Shavkat Mirziyoyev has developed the following bills on raising the press service to public policy, which will strengthen the social and political consciousness of the people and make it a fourth power, which will be able to promote the pressing problems of society.

“Tong yulduzi” (“Morning Star”) and “Klass!” newspapers and “Gulxan” and “G’uncha” magazines were completely transferred to the Ministry of public education of the Republic of Uzbekistan. Ensuring the implementation of legislation on media activities; implementation of monitoring and control over compliance with legislation, state and network standards, guarantees of freedom of speech and information in media, publishing, printing and information-library activities; Participation in the implementation of measures aimed at ensuring information security, preventing prejudices and threats in the information field; raising the morale of our people through book propaganda, promoting the traditions of reading widely, creating electronic and audio books, supporting and developing the activities of printing and distributing book products; organizing the preparation and implementation of targeted programs for the publication of socially significant publications; assistance to publishers in obtaining their position and balance in the International Book Market of book products; participation in the protection of the rights and interests of citizens and legal entities of our country in the field of preparation, distribution, use of Information; development of necessary activities to create equal conditions in the media market for the media, regardless of the form of ownership; development of, development and implementation of measures to introduce innovative technologies into the field; organization of national and international competitions, exhibitions and other public events in the field of media, publishing, printing and information-library activities; development of cooperation with relevant regional, foreign and international organizations in the fields of press and information, publishing, printing, information-library activities. These bills of President Shavkat Mirziyoyev are an effective solution to the problems facing the press.

6. Conclusion

In conclusion, the press is an important tool that informs the people how it is managed, what policies are being carried out in the country. At the same time it is one of the democratic principles. In each period, the press must serve in the interests of the people. Makes the people look like politics and social life. At the same time, together with the people of bōladi for this reason, we must organize a complex of improvements and activities of the press system.

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External feedback and its impact on the learning and retention of the skill of dribbling and rolling

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Abstract: The study dealt with one of the methods of learning, which identified the effect of feedback and retention of the skill of suppression, rolling and accuracy of shooting from movement in soccer, which the researcher addressed to several procedures, including feedback and retention and the extent of the role of feedback during the learning of the skill of suppression and handling. The researcher prepared the educational exercises and carried out by the sample of players of Baghdad five-a-side soccer clubs and their number (14) players from Al-Masafi Sports Club and Baladi five-a-side soccer club, which was sampled equally 9 for each club and excluded (2) for the exploratory experiment. (2) for the exploratory experiment from the research community and outside the sample, as the sample received programs according to external feedback in learning and retaining the skills of suppression and rolling in shooting from the movement and the study reached results that were analyzed and discussed and the most important conclusions were that external feedback develops the results of It was effective in the learning process, especially in the early stages of learning for the sample members, and the recommendations are to pay attention to the stages of learning such skills for the sample members to be the pillar of the national teams in this game and its many requirements.

Keywords: Impact, Learning And Retention, Dribbling And Rolling

Introduction

The field of sports has reached a great development, including collective games, including football, the first popular game in the world, especially in the performance of its many and multiple skills, as the great development in the field of advanced scientific research is one of the most important advantages of the modern era that has prevailed in these various fields of development, especially in sports, one of these influential fields that had a good share in the field of research in various skill, psychological, physical, planning and functional aspects, the adoption of scientific methods in its various forms has become very important for the purpose of achieving progress in the sports level of football, one of the collective games. It is the basis of the necessary axis of every learning process and is one of the most important factors in controlling the modification of movement or behavior to stop the motor performance of the player or the learner.

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The importance of the research lies in the use of external feedback on the result of performance in learning that contributes to the development of the player's mental and linear aspect by pushing and urging him to retain the skill of suppressing, rolling and shooting from the movement for the five-a-side soccer players from the sample.

1.2 Research Problem :

Learning and all its stages and methods that have become essential to the performance stages of all events in the field of team games and the performance of its many skills and on the thinking, processing and understanding of movement performance, as well as the wrong uses become successful, effective and effective only contribute to the external feedback to the player's ideal performance motivation to achieve achievement and codified performance (1: 95).

and on the frequency of effective and efficient responses. Through my exposure to adult learning, I have noticed that feedback is not always given appropriately. To what extent or type of goal, performance, and timing is not given, which reflects negatively on skill learning, and the delay in correcting mistakes will allow learners to repeat them. The purpose of this study is to examine the impact of the revision process on the learner's ability to minimize the errors that accompany the learning process. in order to reach the desired goal of the program, especially in the early stages of its implementation with the players of the Baghdad five-a-side soccer team in Baghdad.

1-3 Research Objectives:

- 1.The numbers of rebounding exercises for the players of the sample.
- 2.To find out the effect of feedback on the learning and retention of dribbling, rolling and shooting from movement in pentathlon players in the Baghdad Pentathlon Center.

1-4 Research hypotheses:

- 1.There are significant differences between the pre- and post-test results of the two research groups, namely, suppression and aiming from movement, for the research sample.
- 2.There is a high retention rate of the research sample in learning to learn the skills of suppression, rolling and shooting from movement, as well as the skills of shooting from movement, as well as the skills of shooting from movement, for the research sample.

1.5 Areas of research:

1.5.1 The human domain: Players of my country's two clubs and five-a-side soccer midfielders.

1.5.2 Time Domain: For the period from 2/18/2024 to 4/18/2024

1-5-3 Field Location: Playgrounds of Baladi Pentathlon Club in Jerusalem.

1.6 Defining terms:

References: These are the various pieces of information that students receive from a variety of sources, which may be direct or delayed, such as directives from a coach or teacher, or directives from other sources, such as the media. The guidance and information is provided before, during, or after performance, and the goal is to recognize the error and modify it to develop the level of performance or achievement. (2: 92)

Performance: It is the inclusion of a number of elements that determine the use of both offense and defense.(3: 121)

Dribbling: The performance of a player's movement with the ball on the field of play, touching, stopping, turning, changing the direction of the ball, and deception.(4:145)

Shooting from the field: It is considered one of the correct outcome of the team's skill performance, planning, emotional control and judgment, and the success of shooting depends on several factors, including Choosing the right place to score from the movement according to the gap in the defense and the shooting capabilities of the shooter to fill this gap. (5: Internet).

Materials and Methods

2- Research Methodology and Field Procedures:

The research problem and its nature determines the scientific method to solve it appropriately so that the researcher achieves his goals by studying it, and the study used the experimental scientific method with an experimental design Because experimentation is considered the most efficient and most effective means to reach accurate knowledge and is the most truthful to solve many practical and theoretical issues. (5: 217)

2.2 Research population and sample:

The researcher identified the research population and its sample from the players of Baghdad Football Club, and the sample was taken from the two clubs of my country, Al-Wasat, in the form of a sample of 14 players. There were (14) players, they were divided into two groups (control and experimental) for each group (6) players and (2) were excluded to conduct the experiment.

2.3 Methods and tools used in the research :

2.3.1 Means of collecting information:

1. Arabic sources: 1.

2. Information Network (Internet)
3. Observation
4. Registration form.

2.3.2 Tools and equipment used in the research:

1. Casio timepiece measuring to the nearest 1/100th No. (1)
2. Metric tape measure
3. Five (5) soccer balls (5)
4. Plastic grills (8)
5. Wall length (2m) and width (3m)
6. A legal target for a ball bearing cassette and a divider
7. Auxiliary staff

2-4 Exploratory experience:

The assistant team, under the supervision of the researcher, carried out the method of performing the tests according to the researcher's feedback and clarification. The workflow and data recording process for the tests of the skills under study and the identification of the factors and obstacles that the researcher may encounter, and obstacles that may be encountered by the researcher when conducting the main study, as the study was carried out with the participation of players from the community of origin and outside the sample (2) Players from the community of origin and outside the research sample from the players of the two clubs at 3:00 p.m. on 12/2/2024:

- Checking the tools, recognizing the time of each test as well as the duration of the tests, knowing the adequacy of the assistant team, the tools, and the appropriateness of the time.

2.4.1 Homogeneity and equivalence of the sample:

In order to ascertain the homogeneity and equivalence of the two research samples in the skills under study, I conducted homogeneity and equivalence tests using the t-test test) for independent samples, as described in the table (1)

Table 1. The homogeneity of the research variables (age, height and weight) of the sample members

Torsion coefficient	Standard deviation	Arithmetic mean	Measuring unit	Variants
1.322	0.955	17.500	Year/Month	Age
0.806	53.409	171.88	m/cm	Length
0.779	41.10	64.00	kg/g	Weight

Table 2. Shows the results of the equivalence of the two groups (control) in the means, standard deviations, errors of variance, t-values, and significance thresholds

Statistical significance	Degree (sig)	Calculate d (T) value	Total officers		Experimental group		Variants
			Standard deviation	Arithmetic mean	Standard deviation	Arithmetic mean	
Non-directional	0.64	0.52	2.48	35.41	3.91	37	Rolling/second
Non-directional	0.64	0.51	0.485	2.31	0.522	2.21	quench/degree
Non-directional	0.57	0.62	0.45	4.15	0.522	6.15	Correction/degree

Degree of significance (n-2), p-value (0.05)

By observing the results in the above table, we find that the t-values are lower, which indicates that there are no significant differences between the two groups (control and experimental).

2.5 Field Research Procedures :

2.5.1 Hiding in plain sight:

I: The skill of hiding inside a square (1 m) from a distance (6 m) (6:78)

The purpose of the test: To measure the accuracy of stopping the ball and regaining control of the abdomen or chest.

Secondly: Rolling the ball around a 4m square back and forth (7:71-72)

The purpose of the test: Measuring rolling by changing direction

Third: Aiming Test: Intersecting Rectangles (8:77)

The purpose of the test: Measuring the accuracy of your aim.

2-6 Tests:

Tests have been implemented (for the skills of rolling, dribbling and shooting from the movement). On 2/15/2024, under the supervision of the trainer and the presence of the researcher, the environment was stabilized as much as possible.

Learning exercises using the retrospective method:

After the completion of the post-tests, the researchers carried out the learning exercises for the research group, according to the method of retrospective exercises. On 2/17/2024 (4/17/2024), as the exercises were prepared according to the educational method of the research group. The research group did not perform the exercises according to this method, and the experts(*), taking into account the opinions of the experts, expressed their The curriculum included (16) units of study, knowing that the preparatory section has similar procedures to the preparatory section. However, the difference between the two groups is the applied and final

part, which focuses on the work of the two groups. Players apply and perform the skills according to the phases of the program, according to the phases of the program and according to the patterns in this way. a method of teaching and retaining the skills needed to perform the skills according to this method in four parts according to the requirements of the Skill Mastery Module: Building Motor Behavior for Skill Mastery and Corrective Movement Behavior for Skill Mastery and Corrective Movement Behavior for Skill Mastery.

These parts aim to develop the player's special abilities and creativity in an artistic way to solve the retention or forgetting of the performance and creativity during the performance. The duration of the program includes (8) weeks (3) modules (Saturday, Monday and Wednesday), the duration of the module is (45) hours (24), and the duration of the module is (45) hours (24) This method of learning is based on the importance of reviewing and retaining the content of the unit in order to improve its effectiveness. Accuracy of correction and that the control group followed the standardized method of the units as prescribed by the trainer.

2.7 Tests and drills:

After the completion of the review exercises and the retention of the skills under study, tests were conducted. The research sample of (6) players was interviewed on 4/18/2024 at 3:00 pm at the Baladi Club stadium, which is located in the center of the club's stadiums, which is located in the center of the stadium.

2-8 Statistical methods:

Spreadsheet (spss) was used to process the data

Results and Discussion

3- Presenting, analyzing and discussing the results:

3-1 Presenting and analyzing the results of the variables and analyzing the results of the two tests, the posttest:

Table 3. Means and standard deviations of the differences between the pre-test and post-test, t-values, p-values, and significance

Statistical significance	Degree (sig)	Calculated (T) value	Total officers		Experimental group		Variants
			Standard deviation	Arithmetic mean	Standard deviation	Arithmetic mean	
Non-directional	0.35	3.72	3.47	34.91	3.28	35.51	Rolling/second
Non-directional	0.63	3.24	0.343	2.81	0.584	2.31	quench/degree

Non-directional	0.06	3.56	0.52	4.24	0.49	4.15	Correction/degree
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Degree of significance (n-1), p-value (0.05)

3-2 Presenting and analyzing the results of the variables, such as pre-testing and post-testing, as well as pre-testing and post-testing of the skills of shooting and aiming from movement:

Table 3. Shows the means and standard deviations of the differences between the pre and post tests and the t-values and the significance of the variables.

Statistical significance	Degree (sig)	Calculated (T) value	Total officers		Experimental group		Variants
			Standard deviation	Arithmetic mean	Standard deviation	Arithmetic mean	
moral	0.00	7.95	1.515	35.91	3.91	38	Rolling/second
moral	0.03	3.24	0.517	2.41	0.422	1.21	quench/degree
moral	0.00	7.52	0.52	2.24	0.88	4.15	Correction/degree

Degree of significance (n-1), p-value (0.05)

3-3 Presenting the results of the variables and analyzing them for the two research groups (male and female) :

Table 5. Shows the means, standard deviations, t-values and significance of the results of the tests. Variables under study for both groups (control and experimental) Variables under study for both groups (control and experimental) Variables under study for both groups

Statistical significance	Degree of retention	Degree (sig)	Calculated (T) value	Total officers		Experimental group		Variants
				Standard deviation	Arithmetic mean	Standard deviation	Arithmetic mean	
moral	27.550	0.00	3.72	3.47	34.91	1.515	35.91	Rolling/second
moral	14.77	0.03	3.24	0.343	2.81	0.517	2.41	quench/degree
moral	28	0.01	3.56	0.52	4.24	0.52	2.24	Correction/degree

Degree of significance (n-1), p-value (0.05)

4.4 Discussion and analysis of learning and retention results for the research variables:

The ability to recognize the data according to the re-reading which means retention and that retention can be reversed, as it was shown that that the sample retained the three skill learning percentages for the total number of retained skills (27.55, 14.77, 28), reflecting how much the students learned through the learning program designed by the instructor, as well as the The feedback that was given to the sample individuals, as it was given to them during the learning of the Rolling and aiming from the movement, as the feedback from the movement is the most important part of the movement.

The feedback can be either external or internal (10: 49), research has used feedback in the form of correction of errors made by participants during skill performance. Sometimes it is given before the performance, especially in the first stages of learning, especially in the early stages of the learning process, after The coach explains the skill and then the player applies the skill and when mistakes are made, the coach corrects the mistakes after the performance. This accelerates the learning of skills, as evidenced by the rate of progression that has been achieved by individuals who realize that, for example These feedbacks are multiple and include movements and feedback information about the performance (11: 122), and feedback was given after each attempt for follow-up and error correction When the performance progresses, it is important to give feedback after every two attempts, in order to show In the advanced stages of learning, the individual does not need to give feedback It can be given after every attempt, but it can be given after several attempts, not more than the number of fingers of one hand, in order to show the consistent performance of the performance. (12: 195).

Conclusion

The researcher concluded the following:

1. 1.Feedback improves performance and increases the individual's learning.
2. 2.Feedback has an effective role in improving learning, especially in the first semester.
3. 3.Skills can be retained after the duration of training, especially when the retention measure is close to that of the training.
4. 4.There was less loss than retention due to the ease of performing the skills.
5. 5.Evidence of improvement in skill performance, due to the appropriateness of the exercises used in the research for the players.

4-2 Recommendations :

The researcher recommends the following:

1. 1.When teaching the stages to students, it should be emphasized that errors should be corrected by using feedback until the student reaches the performance stage.
2. 2.Paying full attention to the role of physical education in all faculties in order to achieve the success of the physical education lesson.
3. 3.Encourage athletes at all levels, especially in academies and centers, to be the base of support for the national teams.

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Article

Mechanosynthesis, Characterization, and Antimicrobial Evaluation of Cadmium(II), Nickel(II), Iron(III), and Chromium(III) Chelates Formed with Paracetamol and Aspirin

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Abstract: This study describes the mechanochemical synthesis of cadmium (Cd(II)), nickel (Ni(II)), and chromium (Cr(III)) as well as iron (Fe(III)) complexes with aspirin and paracetamol, achieved through simple grinding of their metal chlorides without the use of solvents. Additionally, these complexes were prepared using traditional solution-based methods for comparison. Both mechanochemical and conventional products were characterized by examining their solubility, melting points, conductivity, magnetic moments, and infrared (IR) spectra. The IR and analytical data indicated that the complexes formed were identical regardless of the synthesis method. Job's method analysis showed a 1:2 metal-to-ligand ratio for both aspirin and paracetamol complexes. High molar conductance values, ranging from 109.42 to 207.61 $\Omega^{-1}\text{cm}^2\text{mol}^{-1}$ for aspirin complexes and 77.32 to 100.22 $\Omega^{-1}\text{cm}^2\text{mol}^{-1}$ for paracetamol complexes, suggest their electrolytic nature in dimethylsulfoxide (DMSO). The complexes were soluble in dimethylformamide (DMF) and DMSO, with paracetamol complexes also dissolving in acetone, methanol, and diethylether (DEE), and aspirin complexes being soluble in methanol, DMF, and DMSO. Except for the Cr(III) complex, all aspirin complexes were insoluble in water. Magnetic moment values confirmed that all synthesized complexes were paramagnetic, except for the diamagnetic cadmium complexes. The complexes displayed higher thermal stability, decomposing between 163.7-198.3 °C, compared to their respective ligands which decomposed at 170 °C for paracetamol and 137 °C for aspirin. The antimicrobial activity of the ligands and their complexes was tested against two bacterial strains, *Escherichia coli* and *Staphylococcus aureus*, and two fungal strains, *Mucor species* and *Candida species*. The ligands exhibited limited activity against most organisms, whereas most complexes showed activity at all test concentrations, with paracetamol complexes being effective only at higher concentrations.

Keywords: Mechanochemical synthesis, Characterization, and Anti-Microbial Screening; Cd(II), Ni(II), Fe(III), and Cr(III) chelates; Paracetamol and Aspirin

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1. Introduction

The increasing scarcity of energy and material resources, along with the growing concern over industrial pollution, has made the development of cleaner and more efficient synthetic methods essential for modern research (Mottillo et al., 2013). For years, chemists worldwide have been exploring the reactivity of matter to design and create new chemicals for various applications with significant economic impacts, particularly in the health and chemical industries (Cisneros-de et al., 2016).

Recent studies have demonstrated that mechanical force can effectively drive chemical transformations in the solid state (Prochowicz et al., 2016). Mechanochemical reactions, which occur without solvents, are environmentally friendly due to their low energy consumption, reduced reaction times, minimized reagent use, and elimination of solvent

waste (James et al., 2012; Cisneros-de et al., 2016). The development of new materials for solid-state science and technology relies on innovative synthetic methods, highlighting the need to explore solvent-free synthesis (Kurawa, 2008). Recent research has shown that various coordination compounds can be synthesized without the use of solutions (James et al., 2012; Kurawa and Yammama, 2014).

Mechanochemical reactions have been extensively studied by Prof. Janusz Lewiński's team at the Institute of Physical Chemistry of the Polish Academy of Sciences (IPC PAS) and the Faculty of Chemistry at Warsaw University of Technology. Their recent publication describes a simple and effective method for synthesizing perovskites, which are advanced photovoltaic materials with complex crystal structures. Prof. Lewiński notes that mechanochemistry enables the synthesis of hybrid inorganic-organic functional materials with significant potential for the energy sector, including high-quality perovskites for efficient solar cells (Prochowi et al., 2016). Mechanochemistry involves chemical reactions triggered by mechanical energy, where reactants are ground between balls or between a ball and a wall, absorbing energy from the collisions to facilitate the reaction (Dennehy and Collins, 2016; Mochales et al., 2004).

Mechanochemistry involves reactions, typically of solids, driven by mechanical energy, such as grinding in ball mills. This method is gaining attention because it can rapidly and effectively promote reactions between solids with little or no solvent use. Traditionally, it was a secondary approach to chemical synthesis, with solution-based methods being more common. However, mechanochemistry has the potential to become a mainstream technique for two main reasons. First, it has proven effective and advantageous for a growing range of syntheses. Second, reliance on solvents is increasingly seen as unsustainable due to the waste of fossil-derived materials, environmental issues, hazards, and the energy demands of solvent production, purification, and recycling (Stuart et al., 2012).

Solid-state synthesis in molecular coordination chemistry has been established for a long time but remains underutilized (Adams et al., 2010). Recent interest in solid-state synthesis has grown because these reactions can be more convenient, cost-effective, and environmentally friendly compared to solvent-based methods. They also enhance safety, simplify work-up, and provide faster access to complexes that are difficult or time-consuming to synthesize using other methods. For example, the assembly of a hexa-palladium bowl-shaped cluster was achieved in just ten minutes at room temperature by grinding $[\text{Pd}(\text{NO}_3)_2\text{en}]$ with a tripodal ligand, whereas a similar reaction with platinum took over four weeks at 100 °C in D_2O .

Metal complexes are now central to drug design due to the success of metallodrugs like Auranofin, Flamazine, and Cisplatin. This success has expanded the database of chemotherapeutic agents that are less toxic and have improved anticancer, antioxidant, and antimicrobial properties. Consequently, metal complexes are considered potential lead compounds for developing new drugs to combat toxicity and resistance (Chandrathilaka et al., 2013).

Research has shown that grinding protonated ligands $[\text{H}_2\text{LCl}]$ (where L represents imidazole or pyrazole) with metal dichlorides (MCl_2 , where M is Co, Cu, or Zn) in the solid state leads to the formation of hydrogen-bonded metal salts $[\text{H}_2\text{im}]_2[\text{MCl}_4]$ and $[\text{H}_2\text{pz}]_2[\text{MCl}_4]$ for Co and Zn. Additionally, similar salts with Palladium and Platinum can be prepared using solid-state methods to produce $[\text{H}_2\text{im}]_2[\text{MCl}_4]$ (where M is Pd or Pt) (Kurawa et al., 2008).

Metal ion complexation is a fundamental and diverse reaction class, characterized by varying degrees of lability and applications ranging from small-scale uses like radiopharmaceuticals to large-scale processes like metal extraction. Traditionally developed as solution-state chemistry, metal complexation is increasingly being achieved through solvent-free grinding and liquid-assisted grinding (LAG), as indicated by a growing body of literature (Stuart et al., 2013).

A recent study highlighted that metal-organic frameworks (MOFs) can be synthesized via solid-state grinding, yielding structures identical to those produced hydrothermally. For instance, a report in CrystEngComm demonstrated that the microporous MOF [Cu(INA)₂] (INA representing isonicotinic acid) can be formed by grinding precise amounts of starting materials in a ball mill. This environmentally friendly approach, conducted at room temperature, avoids the risk of ligand decomposition and aligns with the increasing emphasis on sustainable chemistry (Marshall, 2015).

With increasing emphasis on environmentally friendly and atom-efficient processes, using green solvents like water or opting for solventless methods is becoming a favored approach in organic chemistry. In recent years, solvent-free synthesis of heterocycles has emerged as a powerful technique, producing less toxic waste and reducing environmental impact. Mechanical forces such as grinding or milling have been extensively employed in solventless organic syntheses. Mechanochemical solid-state reactions, including dry co-grinding, have been explored for various chemical transformations, such as the creation of amides, thioureas, metallodrugs, coupling reactions, and asymmetric reactions. Numerous reviews highlight the history and successes of mechanochemistry (Katritzky, 2014).

Mechanochemically driven solid-state processes have gained significant attention due to their potential technological applications, particularly in developing environmentally friendly and cost-effective dry processes. The mechanochemical synthesis of nanocrystalline materials is a rapidly growing field in solid-state science, encompassing areas like alloys, nanostructured materials, and nanomagnets (Olmos et al., 2008).

Many people have used aspirin, but few know that its related compound from willow bark has been used for pain relief and fever treatment for centuries. Ancient Asian records document its use as far back as 2400 years ago (Lewis, 2003).

2. Materials and Methods

All reagents and chemicals used were of analytical grade and were used without further purification. The active pharmaceutical ingredients, aspirin and paracetamol powders, were sourced from Dana Pharmaceutical Company in Minna, Nigeria. The metal salts utilized included Cadmium(II) chloride, Nickel(II) chloride, Iron(III) chloride, and Chromium(III) chloride.

All glassware was thoroughly washed with detergent, rinsed with distilled water, and dried in an oven at 110 °C. Weighings were performed using a Mettler Toledo balance, model B154. Infrared spectra of the ligands and complexes were recorded with a Shimadzu FTIR 8400S Fourier Transform Infrared Spectrophotometer, covering band ranges from 380 to 4000 cm⁻¹. UV-absorbance measurements were taken with a Jenway 6305 UV-Visible Spectrophotometer, and molar conductance was measured using a Jenway 4010 conductivity meter in DMSO. Magnetic susceptibility of the complexes was measured using a MK 1 Shanwood magnetic susceptibility balance. Decomposition and melting temperatures were recorded with a Gallen Kamp melting apparatus. Bacteria and fungi isolates, including *Escherichia coli*, *Klebsiella pneumoniae*, *Staphylococcus aureus*, *Aspergillus fumigatus*, and a *Mucor species*, were obtained and identified at the Department of Microbiology, Bayero University Kano.

Synthesis of the Complexes

The complexes were synthesized using two methods: a mechanochemical approach (grinding without solvent using a mortar and pestle for 5-10 minutes) and a conventional solution-based method (refluxing with ethanol for 3-4 hours) as a reference.

Mechanosynthesis of Cadmium(II) Aspirin Complex:

A mixture of 1.833 g (0.01 mol) of CdCl_2 and 3.603 g (0.02 mol) of aspirin was ground using an agate mortar and pestle until a fine creamy-white powder was formed, which emitted a choking odor. The product was then dried in a desiccator to yield the complex (Kurawa and Yammama, 2014).

Solution-Based Synthesis of Cadmium(II) Aspirin Complex:

The complex was prepared by mixing an aqueous solution of CdCl_2 (0.01 mol, 1.833 g) in 10 ml of distilled water with an ethanolic solution of aspirin (0.02 mol, 3.603 g) in 20 ml. This mixture was refluxed with constant stirring for 4 hours and then left for 24 hours to complete the complexation. The precipitated complex was filtered, washed with cold ethanol, and dried in a desiccator (Lawal and Obaleye, 2007).

Mechanosynthesis of Nickel(II) Aspirin Complex:

A mixture of 2.3769 g (0.01 mol) of $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$ and 3.603 g (0.02 mol) of aspirin was ground using an agate pestle and mortar until a lemon-green powder was formed, emitting a choking odor. The product was then dried in a desiccator to yield the complex (Kurawa and Yammama, 2014).

Solution-Based Synthesis of Nickel(II) Aspirin Complex:

The complex was prepared by mixing an aqueous solution of $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$ (0.01 mol, 2.3769 g) in 10 ml of water with an ethanolic solution of aspirin (0.02 mol, 3.603 g) in 20 ml. This mixture was refluxed with constant stirring for 4 hours and then left for 24 hours. The resulting crystalline solid was filtered, washed with cold ethanol, and dried for 48 hours in a desiccator (Lawal and Obaleye, 2007).

Mechanosynthesis of Iron(III) Aspirin Complex:

A mixture of 2.70 g (0.01 mol) of $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ and 3.603 g (0.02 mol) of aspirin was ground using an agate mortar and pestle until a black paste was formed. This paste was then dried in a desiccator for 48 hours (Kurawa and Yammama, 2014).

Solution-Based Synthesis of Iron(III) Aspirin Complex:

An aqueous solution of $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ (2.705 g, 0.01 mol) in 10 ml of water was mixed with an ethanolic solution of aspirin (3.603 g, 0.02 mol) in 20 ml. The mixture was refluxed with constant stirring for three hours, then stored in a covered beaker at room temperature. After 24 hours, a solid precipitate formed, which was filtered, washed with cold ethanol, and dried in a desiccator for 48 hours (Lawal and Obaleye, 2007).

Mechanosynthesis of Chromium(III) Aspirin Complex:

A mixture of 1.23 g (0.01 mol) of CrCl_3 and 3.603 g (0.02 mol) of aspirin was ground using an agate mortar and pestle until a whitish-purple powder was obtained. This product was then stored in a desiccator for 24 hours (Kurawa and Yammama, 2014).

Solution-Based Synthesis of Chromium(III) Aspirin Complex:

An aqueous solution of CrCl_3 (1.23 g, 0.01 mol) in 10 ml of water was added to an ethanolic solution of aspirin (3.603 g, 0.02 mol) in 20 ml. The mixture was refluxed with constant stirring for three hours, then stored at room temperature for 24 hours. The whitish-purple crystalline complex was separated by filtration, washed with cold ethanol, and dried in a desiccator (Lawal and Obaleye, 2007).

Mechanosynthesis of Cadmium(II) Paracetamol Complex:

A mixture of 1.833 g (0.01 mol) of CdCl_2 and 3.023 g (0.02 mol) of paracetamol was ground using an agate mortar and pestle until a fine creamy powder was obtained. This product was then dried in a desiccator to form the complex (Kurawa and Yammama, 2014).

Solution-Based Synthesis of Cadmium(II) Paracetamol Complex:

An aqueous solution of CdCl_2 (1.833 g, 0.01 mol) in 10 ml of water was mixed with an ethanolic solution of paracetamol (3.023 g, 0.02 mol) in 25 ml. The mixture was refluxed with constant stirring for three hours and then left for 24 hours. The precipitated complex was filtered, washed with cold ethanol, and dried in a desiccator (Lawal and Obaleye, 2007).

Mechanosynthesis of Nickel(II) Paracetamol Complex:

A mixture of 2.3769 g (0.01 mol) of $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$ and 3.023 g (0.02 mol) of paracetamol was ground using an agate mortar and pestle until a whitish-blue powder was obtained. This product was then dried in a desiccator to form the complex (Kurawa and Yammama, 2014).

Solution-Based Synthesis of Nickel(II) Paracetamol Complex:

An aqueous solution of $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$ (2.376 g, 0.01 mol) in 10 ml of water was added to an ethanolic solution of paracetamol (3.023 g, 0.02 mol) in 25 ml. The mixture was refluxed with constant stirring for three hours and then left for 24 hours. The precipitated complex was filtered, washed with cold ethanol, and dried in a desiccator (Lawal and Obaleye, 2007).

Mechanochemical Synthesis of Iron(III) Paracetamol Complex:

A mixture of 2.705 g (0.01 mol) of $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ and 3.023 g (0.02 mol) of paracetamol was ground using an agate mortar and pestle until a moist paste was obtained. This product was then dried in a desiccator (Kurawa and Yammama, 2014).

Solution-Based Synthesis of Iron(III) Paracetamol Complex:

An aqueous solution of $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ (2.705 g, 0.01 mol) in 10 ml of water was combined with an ethanolic solution of paracetamol (3.023 g, 0.02 mol) in 20 ml. This mixture was refluxed with constant stirring for three hours and then left to stand for 24 hours. The precipitated complex was filtered, washed with cold ethanol, and dried in a desiccator (Lawal and Obaleye, 2007).

Mechanochemical Synthesis of Chromium(III) Paracetamol Complex:

A mixture of 1.23 g (0.01 mol) of CrCl_3 and 3.023 g (0.02 mol) of paracetamol was ground using an agate mortar and pestle until a moist dark or dirty white powder was obtained. This product was then dried in a desiccator (Kurawa and Yammama, 2014).

Solution-Based Synthesis of Chromium(III) Paracetamol Complex:

An aqueous solution of CrCl_3 (1.23 g, 0.01 mol) in 10 ml of water was added to an ethanolic solution of paracetamol (3.023 g, 0.02 mol) in 20 ml. The mixture was refluxed with constant stirring for three hours and then left to stand for 24 hours. The precipitated complex was filtered, washed with cold ethanol, and dried in a desiccator (Lawal and Obaleye, 2007).

Solubility Test:

The solubility of the Schiff base and the metal complexes was tested in various solvents including water, ethanol, methanol, dimethylformamide, acetone, dimethylsulfoxide, diethyl ether, chloroform, nitrobenzene, formaldehyde, and petroleum ether. The results are displayed in a table.

Molar Conductance Measurement of the Ligands and Their Complexes:

Molar conductance was measured by dissolving 0.2 g of each sample in 10 ml of DMSO in a test tube. An electrode was inserted to record the conductance values, and the molar conductance of each metal complex was evaluated. The results are presented in table 4.1.6.

Magnetic Susceptibility Measurement:

To measure magnetic susceptibility, the metal complex is inserted into a balance's capillary tube up to a designated mark. The recorded reading is then used in a formula to calculate the magnetic susceptibility value, X_g .

$$X_g = \frac{C \times L (R - R_0)}{10^9 M}$$

Where:

- C = 1, the proportionality constant
- L = the length of the sample in centimeters

- R = the reading obtained with the sample in the tube
- Ro = the reading obtained with the empty tube
- M = (Ws – Wo), the mass of the sample in grams, where Ws is the weight of the sample plus tube and Wo is the weight of the empty tube to determine the effective magnetic moment:
- Calculate Xm by multiplying the magnetic susceptibility (Xg) by the molar mass (molar magnetic moment).
- Compute the effective magnetic moment (μ_{eff}) using the formula: $\mu_{\text{eff}} = 2.828 (X_m \times T)^{1/2}$, where T is the absolute temperature.

Melting Point and Decomposition Temperature Analysis

To determine the melting points of the ligands and the decomposition temperatures of their complexes, a small amount of each sample was placed into a capillary tube, which was then inserted into a Gallemkamp melting point apparatus. The temperatures at which the ligands melted and the complexes decomposed were recorded and are summarized in Table 4.1.2.

Determination of Metal-to-Ligand Ratio Using Job's Method

Job's method of continuous variation was employed to ascertain the metal-to-ligand ratio in the complex compounds (Angelici, 1971). Solutions of ligands and metal salts, each with a concentration of 3 millimolar, were prepared. Various metal-to-ligand ratios were tested, including 0:16, 1:15, 3:13, 5:11, 7:9, 9:7, 11:5, 13:3, and 15:1, maintaining a total solution volume of 16 ml for each mixture. The mole fraction of the ligand was calculated for each ratio. Metal salt solutions were scanned as blanks to determine the wavelength of maximum absorption (λ_{max}) for each metal ion. Absorbance measurements were taken at λ_{max} , and the number of ligands coordinated to the metal was determined by plotting absorbance against the ligand's mole fraction:

$$n = X_i / (1 - X_i)$$

Where n represents the count of ligands coordinated, and xi denotes the mole fraction observed at peak absorbance.

Gravimetric Analysis for Metal Estimation in Complexes:

To estimate metals in complexes, 0.2 g of each complex is dissolved in 25 cm³ of distilled water with 5 cm³ of concentrated nitric acid, stirred vigorously, and then heated almost to dryness. The cooled mixture is filtered to obtain a solution containing metal ions (Vogel, 1989; Adamu, 2009).

For nickel(II) complexes, the filtrate is diluted with 97 cm³ of distilled water, heated to 70–80°C, and treated with a slight excess of 1% dimethylglyoxime (DMG) in alcohol and dilute ammonia solution. After cooling, the precipitate is filtered, dried at 110°C, and weighed as $[\text{Ni}(\text{C}_4\text{H}_7\text{O}_2\text{N}_2)_2]$ (Vogel, 1989).

For iron(III) complexes, the filtrate is diluted to 100 cm³ with distilled water, then treated with aqueous ammonia until precipitation begins. The mixture is heated, cooled, filtered, washed with 75 cm³ of 1% ammonium nitrate, and dried at 110 °C before weighing as Fe₂O₃ (Vogel, 1989).

For Cadmium (Cd(II) Complexes, A 150 cm³ solution of the cadmium(II) complex is prepared and boiled. After removing the heat source, a 3.3 % quinaldic acid solution is added dropwise with stirring until slightly excess. Dilute ammonia is then added dropwise. Upon cooling, a curdy white precipitate forms, which is filtered, washed with cold water, dried at 125 °C to constant weight, and weighed as $\text{Cd}(\text{C}_{10}\text{H}_6\text{O}_2)_2$ (Vogel, 1989).

For Chromium (Cr(III) Complexes, The Cr(III) complex filtrate is diluted to 100 cm³ with distilled water. Sodium hydroxide is added until precipitation starts. An acetate buffer (10 cm³ of 6 M acetic acid and 0.6 M sodium acetate) is followed by 10 cm³ each of lead nitrate (3.5 g/100 cm³) and potassium bromate (2.0 g/100 cm³) solutions. The mixture

is heated to 90-95°C, then cooled, filtered, washed with 0.1% nitric acid, dried at 120°C, and weighed as PbCrO₄ (Vogel, 1989).

For Water Hydration In The Complex Compounds, For each complex, 0.2 g was heated at 110 °C until a constant weight was achieved. The water content in the complex was then calculated using the provided formula, with results detailed in Table 4.2.4.

$$\% \text{ of water loss} = \frac{\text{lost in weight}}{\text{weight of the complex taken (0.2g)}} \times \frac{100\%}{1}$$

(Aliyu and Abdullahi, 2009).

Antimicrobial Activity Test

The ligands and their corresponding metal complexes were tested for antibacterial activity against *Escherichia coli* and *Staphylococcus aureus*, as well as antifungal activity against *Candida* species and *Mucor* species.

Antibacterial Activity Test

Using the dilution method described by Yusha'u and Salisu (2011), various test concentrations were prepared. A stock solution was made by dissolving 0.06 g of the ligands or metal complexes in 1 cm³ of DMSO, resulting in a concentration of 60 µg per cm³. From this stock solution, a 30 µg concentration was prepared by mixing 0.5 cm³ of the stock solution with 0.5 cm³ of DMSO. Further dilution to 15 µg was achieved by taking 0.5 cm³ of the 30 µg solution and adding 0.5 cm³ of DMSO.

Paper discs were soaked in these various concentrations and used to inoculate culture plates containing nutrient agar. The plates were incubated at 37 °C for 24 hours. The antibacterial activity was assessed by measuring the diameter of the inhibition zones (Yusha'u and Salisu, 2011).

Antifungal Activity Test

The antifungal activity was evaluated using the dilution method outlined by Yusha'u and Salisu (2011). To prepare the test concentrations, 0.06 g of either the ligand or its metal complexes were dissolved in 1 cm³ of DMSO, resulting in a stock solution with a concentration of 60 µg per cm³. A 30 µg solution was created by mixing 0.5 cm³ of the stock solution with 0.5 cm³ of DMSO. Similarly, a 15 µg solution was prepared by diluting 0.5 cm³ of the 30 µg solution with an additional 0.5 cm³ of DMSO. These different concentrations were used to impregnate 50 paper discs, which were then used to inoculate culture plates. The plates, containing sabouraud dextrose agar, were incubated at room temperature for 48 hours. The antifungal activity of the ligands and their complexes was assessed using the paper disc technique, with the inhibition zones measured after 72 hours, as per Hassan et al. (2006).

3. Results

The findings from the analysis of the ligand and its metal complexes are detailed below:

Table 4.1.1. Physical Characteristics of Paracetamol and Its Metal Complexes Produced Using Both Methods

Compound	Method	% Yield	Colour	Melting Temperature (°C)	Decomposition Temperature (°C)
Paracetamol	-	-	White	170	-
[Cd(Par) ₂ (H ₂ O) ₂] . 2H ₂ O	Mech.	78.11	Creamy-white	-	191.4
[Cd(Par) ₂ (H ₂ O) ₂] . 2H ₂ O	Solution	60.87	Creamy-white	-	189.6
[Ni(Par) ₂ (H ₂ O) ₂] . 2H ₂ O	Mech.	87.42	Pinkish-white	-	192.9
[Ni(Par) ₂ (H ₂ O) ₂] . 2H ₂ O	Solution	63.20	Pinkish-white	-	193.7
[Fe(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Mech.	82.53	Black	-	198.3
[Fe(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Solution	61.14	Black	-	196.6
[Cr(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Mech.	86.74	Whitish-Blue	-	187.6
[Cr(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Solution	66.84	Whitish-Blue	-	187.8

Table 4.1.2. Physical Characteristics of Aspirin and its Metal Complexes Synthesized by both Methods

Compound	Method	% Yield	Colour	Melting Temperature (°C)	Decomposition Temperature (°C)
Aspirin	-	-	White	137	-
[Cd(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	Mech.	91.00	White	-	172.4
[Cd(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	Solution	69.21	White	-	169.7
[Ni(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	Mech.	80.53	Pale-green	-	178.3
[Ni(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	Solution	53.81	Pale-green	-	167.8
[Fe(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Mech.	79.10	Black	-	163.7

[Fe(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Solution	58.33	Black	-	164.5
[Cr(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Mech.	79.12	Pale-blue	-	181.3
[Cr(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Solution	58.34	Pale-blue	-	178.6

Table 4.1.3. Solubility of Paracetamol and Its Metal Complexes Prepared by Both Methods

Ligand /Compound	Method	Distilled Water	Ethanol	Methanol	Acetone	Chloroform	DEE	Petroleum Ether	DMF	DMSO	Nitro-Benzene
Paracetamol	-	SS	S	S	SS	SS	SS	SS	S	S	IS
[Cd(Par) ₂ (H ₂ O) ₂]. 2H ₂ O	Mech.	IS	IS	SS	S	IS	S	IS	S	S	IS
[Cd(Par) ₂ (H ₂ O) ₂]. 2H ₂ O	Soln.-based	IS	IS	SS	S	IS	S	IS	S	S	IS
[Ni(Par) ₂ (H ₂ O) ₂]. 2H ₂ O	Mech.	IS	IS	S	S	IS	S	IS	S	S	IS
[Ni(Par) ₂ (H ₂ O) ₂]. 2H ₂ O	Soln.-based	IS	S	S	S	IS	S	IS	S	S	IS
[Fe(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Mech.	SS	S	S	S	IS	S	IS	SS	S	IS
[Fe(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Soln.-based	SS	S	S	S	IS	S	IS	SS	S	IS
[Cr(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Mech.	IS	IS	S	S	IS	S	IS	SS	S	IS
[Cr(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Soln.-based	IS	IS	S	S	IS	S	IS	SS	S	IS

Key: S=soluble, SS=slightly soluble, IS=Insoluble

Table 4.1.4. Solubility of Aspirin and its Metal Complexes Synthesized by both Methods

Ligand / Compound	Method	Distilled Water	Ethanol	Methanol	Acetone	Chloroform	DEE	Petroleum Ether	DMF	DMSO	Nitrobenzene
Aspirin	-	SS	SS	S	IS	IS	SS	IS	S	S	IS
[Cd(Asp) ₂ (H ₂ O) ₂].2H ₂ O	Mech	IS	IS	SS	SS	SS	SS	IS	S	S	IS
[Cd(Asp) ₂ (H ₂ O) ₂].2H ₂ O	Soln.-based	IS	IS	SS	SS	SS	SS	IS	S	S	IS
[Ni(Asp) ₂ (H ₂ O) ₂].2H ₂ O	Mech.	IS	S	S	S	S	S	IS	S	S	IS
[Ni(Asp) ₂ (H ₂ O) ₂].2H ₂ O	Soln.-based	IS	S	S	S	S	S	IS	S	S	IS
[Fe(Asp) ₂ (H ₂ O) ₂].Cl.2H ₂ O	Mech.	SS	SS	S	S	SS	S	IS	S	S	IS
[Fe(Asp) ₂ (H ₂ O) ₂].Cl.2H ₂ O	Soln.-based	SS	SS	S	S	SS	S	IS	S	S	IS
[Cr(Asp) ₂ (H ₂ O) ₂].Cl.2H ₂ O	Mech.	IS	IS	SS	S	SS	SS	IS	SS	S	IS
[Cr(Asp) ₂ (H ₂ O) ₂].Cl.2H ₂ O	Soln.-based	IS	IS	SS	S	SS	SS	IS	SS	S	IS

Key: S=soluble, SS=slightly soluble, IS=Insoluble

Table 4.1.5. Magnetic Moment and Molar Conductivity of Paracetamol Metal Complexes Produced by Both Methods

Complex	Method	Magnetic Susceptibility(Xg) (g ⁻¹)	Molar Magnetic (Xm) (mol ⁻¹)	Effective Magnetic Moment (BM)	Molar Conductivity (Ω ⁻¹ g.dm ⁻³)
[Cd(Par) ₂ (H ₂ O) ₂] . 2H ₂ O	Mech.	-6.330 × 10 ⁻⁷	-3.072 × 10 ⁻⁴	-	2.03 × 10 ⁻⁶
[Cd(Par) ₂ (H ₂ O) ₂] . 2H ₂ O	Soln.	-6.182 × 10 ⁻⁷	-3.000 × 10 ⁻⁴	-	2.065 × 10 ⁻⁶
[Ni(Par) ₂ (H ₂ O) ₂] . 2H ₂ O	Mech.	7.183 × 10 ⁻⁶	3.105 × 10 ⁻³	2.62	1.875 × 10 ⁻⁶
[Ni(Par) ₂ (H ₂ O) ₂] . 2H ₂ O	Soln.	7.311 × 10 ⁻⁶	3.161 × 10 ⁻³	2.74	1.790 × 10 ⁻⁶
[Fe(Par) ₂ (H ₂ O) ₂].Cl.2H ₂ O	Mech.	2.870 × 10 ⁻⁵	1.334 × 10 ⁻²	5.64	3.945 × 10 ⁻⁶

[Fe(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Soln.	2.694×10^{-5}	1.252×10^{-2}	5.46	3.875×10^{-6}
[Cr(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Mech.	2.223×10^{-5}	9.454×10^{-3}	4.75	2.085×10^{-6}
[Cr(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Soln.	2.086×10^{-5}	8.872×10^{-3}	4.60	2.170×10^{-6}

Table 4.1.6. Effective Magnetic Moment and Molar Conductance of Aspirin Metal Complexes Synthesized by both Methods

Complex	Method	Magnetic Susceptibility(Xg) (g ⁻¹)	Molar Magnetic (Xm) (mol ⁻¹)	Effective Magnetic Moment (BM)	Molar Conductivity (Ω ⁻¹ gdm ⁻³)
[Cd(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	Mech.	-4.48×10^{-7}	-2.434×10^{-4}	-	3.820×10^{-6}
[Cd(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	Solution	-4.52×10^{-7}	-2.456×10^{-4}	-	3.885×10^{-6}
[Ni(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	Mech.	7.034×10^{-6}	3.447×10^{-3}	2.87	2.510×10^{-6}
[Ni(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	Solution	7.029×10^{-6}	3.444×10^{-3}	2.87	2.470×10^{-6}
[Fe(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Mech.	2.739×10^{-5}	1.431×10^{-2}	5.84	3.850×10^{-6}
[Fe(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Solution	2.741×10^{-5}	1.433×10^{-2}	5.84	3.615×10^{-6}
[Cr(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Mech.	2.041×10^{-5}	9.864×10^{-3}	4.85	2.305×10^{-6}
[Cr(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Solution	2.028×10^{-5}	9.801×10^{-3}	4.83	2.265×10^{-6}

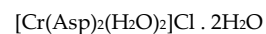
Table 4.1.7. The IR spectra of Paracetamol and its Metal Complexes Synthesized by both Methods

Ligand / Complex	Method	ν(N-H) cm ⁻¹	ν(O-H) cm ⁻¹	ν(N-H) cm ⁻¹ bend	ν(C=O)cm ⁻¹	(M-N) cm ⁻¹	(M-O) cm ⁻¹
Paracetamol	-	3324	3106	-	1652	-	-
[Cd(Par) ₂ (H ₂ O) ₂] . 2H ₂ O	Mech.	3387	3253	1566	1629	683	504

[Cd(Par) ₂ (H ₂ O) ₂] . 2H ₂ O	Soln.	3384	3167	1566	1638	683	508
[Ni(Par) ₂ (H ₂ O) ₂] . 2H ₂ O	Mech.	3313	3180	1566	1655	680	503
[Ni(Par) ₂ (H ₂ O) ₂] . 2H ₂ O	Soln.	3318	3151	1566	1655	679	503
[Fe(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Mech.	3342	3168	1513	1656	677	503
[Fe(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Soln.	3344	3212	1510	1655	679	504
[Cr(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Mech.	3416	3162	1518	1643	681	503
[Cr(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Soln.	3372	3240	1521	1639	681	503

Table 4.1.8. The IR Spectra of Aspirin and its Metal Complexes Synthesized by both Methods

Ligand / Complex	Method	$\nu(\text{O-H}) \text{ cm}^{-1}$	$\nu(\text{C=O})\text{cm}^{-1}$ of ester	$\nu(\text{C=O})\text{cm}^{-1}$ of carboxylic acid	(C-O) cm^{-1}	(C-O) cm^{-1}	(M-O) cm^{-1}
Aspirin	-	2866	1752	1680	1286	1095	-
[Cd(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	Mech.	3227	1758	1685	1294	1097	511,
[Cd(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	Soln.	3465	1756	1682	1298	1093	503,
[Ni(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	Mech.	3331	1749	1685	1269	1097	444
[Ni(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	Soln.	3334	1746	1686	1267	1097	503
[Fe(Asp) ₂ (H ₂ O) ₂]Cl . 2H ₂ O	Mech.	3236	1755	1674	1295	1093	503
[Fe(Asp) ₂ (H ₂ O) ₂]Cl . 2H ₂ O	Soln.	3233	1758	1679	1293	1092	503
[Cr(Asp) ₂ (H ₂ O) ₂]Cl . 2H ₂ O	Mech.	3419	1761	1688	1285	1097	503



Soln.

3385

1759

1684

1284

1093

503

Table 4.1.9. Antibacterial Activity of Aspirin, Paracetamol and their Metal Complexes

Test Organism	Ligand / Complex	Inihibition Zone (mm) at different Concentration (µg/disc)			Control disc Cyproflaxicine (10 µg/disc)
		15	30	60	
<i>Escherichia Coli</i>	Aspirin	NZI	NZI	NZI	46
	$[\text{Cd}(\text{Asp})_2(\text{H}_2\text{O})_2] \cdot 2\text{H}_2\text{O}$	10	10	18	
	$[\text{Ni}(\text{Asp})_2(\text{H}_2\text{O})_2] \cdot 2\text{H}_2\text{O}$	NZI	14	28	
	$[\text{Fe}(\text{Asp})_2(\text{H}_2\text{O})_2]\text{Cl} \cdot 2\text{H}_2\text{O}$	NZI	NZI	NZI	
	$[\text{Cr}(\text{Asp})_2(\text{H}_2\text{O})_2]\text{Cl} \cdot 2\text{H}_2\text{O}$	12	14	18	
	Paracetamol	NZI	NZI	NZI	
	$[\text{Cd}(\text{Par})_2(\text{H}_2\text{O})_2] \cdot 2\text{H}_2\text{O}$	NZI	8	12	
	$[\text{Ni}(\text{Par})_2(\text{H}_2\text{O})_2] \cdot 2\text{H}_2\text{O}$	NZI	NZI	NZI	
	$[\text{Fe}(\text{Par})_2(\text{H}_2\text{O})_2]\text{Cl} \cdot 2\text{H}_2\text{O}$	NZI	NZI	NZI	
	$[\text{Cr}(\text{Par})_2(\text{H}_2\text{O})_2]\text{Cl} \cdot 2\text{H}_2\text{O}$	8	12	18	
<i>Staphylococcus Aureus</i>	Aspirin	NZI	NZI	NZI	32
	$[\text{Cd}(\text{Asp})_2(\text{H}_2\text{O})_2] \cdot 2\text{H}_2\text{O}$	12	16	21	
	$[\text{Ni}(\text{Asp})_2(\text{H}_2\text{O})_2] \cdot 2\text{H}_2\text{O}$	NZI	8	12	
	$[\text{Fe}(\text{Asp})_2(\text{H}_2\text{O})_2]\text{Cl} \cdot 2\text{H}_2\text{O}$	8	11	14	

[Cr(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	NZI	12	18
Paracetamol	NZI	NZI	NZI
[Cd(Par) ₂ (H ₂ O) ₂].2H ₂ O	NZI	8	12
[Ni(Par) ₂ (H ₂ O) ₂].2H ₂ O	NZI	NZI	NZI
[Fe(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	NZI	NZI	NZI
[Cr(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	NZI	NZI	NZI

Key: NZI = No Zones of Inhibition

Table 4.2.1. Antifungal Activity of Aspirin, Paracetamol and their Metal Complexes

Test Organism	Ligand/Complex	Inihibition Zone (mm) at different Concentration (µg/disc)			Control disc Ketoconazole (10 µg/disc)
		15	30	60	
<i>Mucus Specie</i>	Aspirin	NZI	NZI	NZI	36
	[Cd(Asp) ₂ (H ₂ O) ₂].2H ₂ O	NZI	18	28	
	[Ni(Asp) ₂ (H ₂ O) ₂].2H ₂ O	NZI	8	12	
	[Fe(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	NZI	NZI	NZI	
	[Cr(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	NZI	NZI	NZI	
	Paracetamol	NZI	NZI	NZI	
	[Cd(Par) ₂ (H ₂ O) ₂].2H ₂ O	NZI	NZI	NZI	
	[Ni(Par) ₂ (H ₂ O) ₂].2H ₂ O	NZI	NZI	NZI	

<i>Candida</i>	[Fe(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	NZI	NZI	NZI	41
	[Cr(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	NZI	NZI	NZI	
	Aspirin	NZI	NZI	NZI	
	[Cd(Asp) ₂ (H ₂ O) ₂].2H ₂ O	16	28	31	
	[Ni(Asp) ₂ (H ₂ O) ₂].2H ₂ O	NZI	26	31	
	[Fe(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	22	32	40	
	[Cr(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	28	32	38	
	Paracetamol	NZI	NZI	NZI	
	[Cd(Par) ₂ (H ₂ O) ₂].2H ₂ O	NZI	NZI	14	
	[Ni(Par) ₂ (H ₂ O) ₂].2H ₂ O	NZI	10	14	
	[Fe(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	NZI	NZI	NZI	
	[Cr(Par) ₂ (H ₂ O) ₂]Cl.2H ₂ O	20	24	38	

Key: NZI = No Zones of Inhibition

Table 4.2.2. Mole Ratio of Metal : Ligand in the Complexes using Job's Method

Complex	X	1 - X	n = X/(1 - X)
[Cd(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	0.6	0.40	1.5 ≈ 2
[Ni(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	0.61	0.39	1.56 ≈ 2
[Fe(Asp) ₂ (H ₂ O) ₂]Cl .2H ₂ O	0.61	0.39	1.56 ≈ 2
[Cr(Asp) ₂ (H ₂ O) ₂]Cl .2H ₂ O	0.61	0.39	1.56 ≈ 2

$[\text{Cd}(\text{Par})_2(\text{H}_2\text{O})_2] \cdot 2\text{H}_2\text{O}$	0.61	0.39	$1.56 \approx 2$
$[\text{Ni}(\text{Par})_2(\text{H}_2\text{O})_2] \cdot 2\text{H}_2\text{O}$	0.6	0.40	$1.5 \approx 2$
$[\text{Fe}(\text{Par})_2(\text{H}_2\text{O})_2]\text{Cl} \cdot 2\text{H}_2\text{O}$	0.61	0.39	$1.56 \approx 2$
$[\text{Cr}(\text{Par})_2(\text{H}_2\text{O})_2]\text{Cl} \cdot 2\text{H}_2\text{O}$	0.61	0.39	$1.56 \approx 2$

Table 4.2.3. Determination of Water of Hydration In The Paracetamol Complexes

Complex	Initial mass (g)	Final mass (g)	Loss in mass	% of water
$[\text{Cd}(\text{Asp})_2(\text{H}_2\text{O})_2] \cdot 2\text{H}_2\text{O}$	0.2	0.191	0.009	4.5
$[\text{Cd}(\text{Asp})_2(\text{H}_2\text{O})_2] \cdot 2\text{H}_2\text{O}$	0.2	0.187	0.013	6.5
$[\text{Ni}(\text{Asp})_2(\text{H}_2\text{O})_2] \cdot 2\text{H}_2\text{O}$	0.2	0.189	0.011	5.5
$[\text{Ni}(\text{Asp})_2(\text{H}_2\text{O})_2] \cdot 2\text{H}_2\text{O}$	0.2	0.186	0.014	7.0
$[\text{Fe}(\text{Asp})_2(\text{H}_2\text{O})_2]\text{Cl} \cdot 2\text{H}_2\text{O}$	0.2	0.190	0.010	5.0
$[\text{Fe}(\text{Asp})_2(\text{H}_2\text{O})_2]\text{Cl} \cdot 2\text{H}_2\text{O}$	0.2	0.187	0.013	6.5
$[\text{Cr}(\text{Asp})_2(\text{H}_2\text{O})_2]\text{Cl} \cdot 2\text{H}_2\text{O}$	0.2	0.189	0.011	5.5
$[\text{Cr}(\text{Asp})_2(\text{H}_2\text{O})_2]\text{Cl} \cdot 2\text{H}_2\text{O}$	0.2	0.185	0.015	7.5

Table 4.2.4. Determination of Water of Hydration In The Aspirin Complexes

Complex	Initial mass (g)	Final mass (g)	Loss in mass	% of water
$[\text{Cd}(\text{Asp})_2(\text{H}_2\text{O})_2] \cdot 2\text{H}_2\text{O}$	0.2	0.189	0.011	5.5
$[\text{Cd}(\text{Asp})_2(\text{H}_2\text{O})_2] \cdot 2\text{H}_2\text{O}$	0.2	0.185	0.015	7.5

[Ni(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	0.2	0.188	0.012	6.0
[Ni(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	0.2	0.186	0.014	7.0
[Fe(Asp) ₂ (H ₂ O) ₂]Cl . 2H ₂ O	0.2	0.190	0.010	5.0
[Fe(Asp) ₂ (H ₂ O) ₂]Cl . 2H ₂ O	0.2	0.187	0.013	6.5
[Cr(Asp) ₂ (H ₂ O) ₂]Cl . 2H ₂ O	0.2	0.191	0.009	4.5
[Cr(Asp) ₂ (H ₂ O) ₂]Cl . 2H ₂ O	0.2	0.187	0.013	6.5

Table 4.2.5. Gravimetric Analysis Data for Paracetamol Complexes

Metal	Method	Weight of complex used (g)	Gravimetric factor (g)	Weight of prdt obtained (g)	Average Wght of prdt (g)	% Composition of Metal (g.mol ⁻¹)	
						Calculated	Observed
[Cd(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	Mech.	0.2	0.2463	0.1674	0.0412	23.15	20.60
[Cd(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	Soln.	0.2	0.2463	0.1746	0.0430	23.15	21.50
[Ni(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	Mech.	0.2	0.2251	0.1102	0.0248	13.58	12.40
[Ni(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	Soln.	0.2	0.2251	0.1150	0.0259	13.58	12.95
[Fe(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Mech.	0.2	0.3497	0.0668	0.0234	12.02	11.70
[Fe(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Soln.	0.2	0.3497	0.0688	0.0241	12.02	12.05
[Cr(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Mech.	0.2	0.1609	0.1538	0.0247	13.93	12.35
[Cr(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Soln.	0.2	0.1609	0.1584	0.0255	13.93	12.75

Table 4.2.6. Gravimetric Analysis Data for Aspirin Metal Complexes

Metal	Method	Weight of complex used (g)	Gravimetric factor (g)	Weight of prdt obtained (g)	Average wght of prdt (g)	% Composition of Metal (X_g) $\times 10^{-3}$ (mol ⁻¹)	
						Calculated	Observed
[Cd(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	Mech.	0.2	0.2463	0.1724	0.0425	20.69	21.25
[Cd(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	Soln.	0.2	0.2463	0.1783	0.0439	20.69	21.95
[Ni(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	Mech.	0.2	0.2033	0.1146	0.0233	11.98	11.65
[Ni(Asp) ₂ (H ₂ O) ₂] . 2H ₂ O	Soln.	0.2	0.2033	0.1137	0.0230	11.98	11.50
[Fe(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Soln.	0.2	0.3497	0.0646	0.0226	11.46	11.30
[Fe(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Soln.	0.2	0.3497	0.0579	0.0202	10.69	10.10
[Cr(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Mech.	0.2	0.1609	0.1301	0.0209	10.76	10.45
[Cr(Asp) ₂ (H ₂ O) ₂]Cl.2H ₂ O	Soln.	0.2	0.1609	0.1315	0.0212	10.76	10.60

4. Discussion

The mechanochemical solid-state synthesis method used in this study produced the desired products in approximately 5 minutes, a significant improvement over the conventional solution-based reflux method, which typically requires several hours or even days. The analytical data for the metal complexes of both paracetamol and aspirin, synthesized by these two methods, were comparable, although there were differences in yield percentages. The complexes formed via the mechanochemical method were notably more productive, with yields ranging from 87.42 % to 91.00 %, compared to the solution-based method's yields of 66.84 % to 69.21 %. Most of the synthesized complexes, except those with cadmium, exhibited color due to electronic transitions of e_g and t_{2g} electrons. Additionally, paracetamol itself decomposed at 170 °C, while its metal complexes had decomposition temperatures between 187.6 °C and 198.3 °C, indicating successful coordination with metal ions and enhanced stability, as detailed in Table 4.1.1.

Aspirin decomposes at 137 °C, whereas its metal complexes have higher decomposition temperatures, ranging from 164.5 °C to 181.3 °C, regardless of whether they were synthesized via mechanochemical or solvent-based methods, as shown in Table 4.1.2. This increase in decomposition temperature suggests effective coordination between the ligand and the metal ions.

Paracetamol exhibits slight solubility in water, acetone, chloroform, diethyl ether (DEE), and petroleum ether (PE) at room temperature, but it dissolves well in ethanol, methanol, DMF, and DMSO, and is insoluble in nitrobenzene and formaldehyde. Its metal complexes are soluble in acetone, methanol, DMF, DMSO, and DEE. Aspirin is soluble in methanol, DMF, and DMSO, but its complexes are generally insoluble in water, except for Cr(III) complexes. The differences in solubility can be attributed to the non-polar nature of metal(II) complexes and the slightly polar nature of metal(III) complexes.

Table 4.1.5 displays the magnetic properties of paracetamol metal complexes. According to the magnetic susceptibility measurements, Cd(II) paracetamol complexes are diamagnetic, while Ni(II), Fe(III), and Cr(III) complexes, synthesized by both mechanochemical and solution-based methods, are paramagnetic. The paramagnetic behavior is attributed to the presence of unpaired electrons in the partially filled d-orbitals of the central metal ions (Adesina, 2008), whereas diamagnetism is due to all electrons being paired in the d-orbital.

The magnetic moment values, which can also indicate the likely geometry of the complexes, are detailed in Table 4.1.5. At room temperature, the effective magnetic moments for the paracetamol metal complexes were consistent across both synthesis methods. For Ni(II), Fe(III), and Cr(III) complexes, the magnetic moments ranged from 2.62 BM to 2.74 BM, 5.64 BM to 5.46 BM, and 4.75 BM to 4.60 BM, respectively. No magnetic moment was recorded for the Cd(II) complexes in this study.

The effective magnetic moment values of 4.75 BM and 4.60 BM observed for Cr(III) paracetamol complexes are higher than the spin-only magnetic moment range (3.7-3.9 BM) for a high-spin octahedral geometry, as noted by LibreTexts (2015). This supports the proposal that these complexes have a high-spin octahedral structure.

For Ni(II) paracetamol complexes, the magnetic moments of 2.62 BM and 2.74 BM, obtained from mechanochemical and solution-based methods respectively, suggest a tetrahedral geometry (Adekunle, 2013).

The effective magnetic moments for Fe(III) paracetamol complexes, recorded as 5.64 BM and 5.46 BM, fall within the expected range for high-spin octahedral geometry. This aligns with Adekunle's (2013) findings. Deviations from spin-only values may be attributed to spin-orbit coupling.

For aspirin complexes, similar μ_{eff} values were observed for both mechanochemical and solution methods, with all complexes except Cd(II) being paramagnetic. Cd(asp)₂(H₂O)₂ is diamagnetic due to the lack of unpaired electrons in the cadmium(II)

ion's d-orbital. Effective magnetic moment data for aspirin complexes are summarized in Table 4.1.6, with no values for Cd(II) aspirin complexes in this study (Yousif et al., 2013).

Ni(II) aspirin complexes showed magnetic moments of 2.87 BM for both methods, indicating high-spin tetrahedral geometry, though slightly higher than the spin-only value of 2.83 BM, possibly due to orbital effects (El-Halawa, 2015).

For Fe(III) aspirin complexes, the observed μ_{eff} of 5.84 BM for both methods suggests an octahedral geometry. Cr(III) aspirin complexes displayed μ_{eff} values of 4.85 BM and 4.83 BM, which fall within the expected range (4.7-4.9 BM) for high-spin octahedral geometry around Cr(III) ions, as reported by LibreTexts (2015).

Table 4.1.5 shows the molar conductance values of paracetamol complexes in 1×10^{-3} M DMSO at room temperature. The conductance values for the mechanochemical and solution-based products are similar. Specifically, the molar conductance for Cd(II), Ni(II), Fe(III), and Cr(III) paracetamol complexes ranges from 2.03×10^{-6} to $3.945 \times 10^{-6} \Omega^{-1}\text{cm}^2\text{mol}^{-1}$ for mechanochemical products and from 2.065×10^{-6} to $3.875 \times 10^{-6} \Omega^{-1}\text{cm}^2\text{mol}^{-1}$ for solution-based products. These values fall within the expected range for non-electrolytes in DMSO, as reported by Adekunle (2013).

Table 4.1.6 presents the molar conductance of aspirin metal complexes in 1×10^{-3} M DMSO at room temperature. The conductance values for both mechanochemical and solution-based products range from 94.40 to 207.61 $\Omega^{-1}\text{cm}^2\text{mol}^{-1}$. Specifically, the molar conductance values for Cd(II), Ni(II), Fe(III), and Cr(III) aspirin complexes are 3.820×10^{-6} to $3.885 \times 10^{-6} \Omega^{-1}\text{cm}^2\text{mol}^{-1}$ for mechanochemical products and 2.510×10^{-6} to $2.470 \times 10^{-6} \Omega^{-1}\text{cm}^2\text{mol}^{-1}$ for solution-based products. This range indicates that the complexes are also non-electrolytes in DMSO, according to Adekunle (2013).

Table 4.1.7 shows the IR spectral data for paracetamol and its metal complexes. In free paracetamol, the absorption band at 3324 cm^{-1} is attributed to the N-H vibration. This band shifts to $3313\text{-}3387 \text{ cm}^{-1}$ in the metal complexes, indicating coordination of the paracetamol nitrogen with the central metal ion. New peaks appearing in the range of $677\text{-}683 \text{ cm}^{-1}$ in the complexes confirm the formation of M-N bonds (Fugu et al., 2013). The band at 3106 cm^{-1} corresponds to the O-H vibration of the phenolic group in paracetamol.

The observed smaller BM values and the size of Ni^{2+} and Cd^{2+} ions suggest a tetrahedral structure for their complexes. In contrast, the larger Fe^{3+} and Cr^{3+} ions and higher BM values, along with the C=O band shifting to a lower range, indicate an octahedral geometry for their complexes. The disappearance of the phenolic O-H band suggests coordination through phenolic oxygen after deprotonation, supported by new bands at $503\text{-}508 \text{ cm}^{-1}$ due to M-O bonding.

The IR spectra of the complexes also show bands in the $3144\text{-}3389 \text{ cm}^{-1}$ range, indicating the presence of coordinated water molecules (Aliyu et al., 2009).

In free aspirin, the absorption band at 2866 cm^{-1} corresponds to the O-H vibration of the carboxylic group. This band disappears in the metal complexes, suggesting that the O-H group is involved in coordination. The bands at 1752 cm^{-1} and 1680 cm^{-1} for ester and carboxylic acid C=O vibrations shift to $1659\text{-}1758 \text{ cm}^{-1}$ in the complexes, indicating these groups are also coordination sites. The C-O stretching vibrations of the carboxylic and ester groups in aspirin shift to $1295\text{-}1267 \text{ cm}^{-1}$ and $1097\text{-}1093 \text{ cm}^{-1}$, respectively, supporting the formation of new compounds. Bands at $444\text{-}503 \text{ cm}^{-1}$, not present in the free aspirin spectrum, are attributed to M-O stretching vibrations, further supporting the coordination of aspirin with the metal ions.

The IR spectra of the metal complexes reveal bands in the $3144\text{-}3389 \text{ cm}^{-1}$ range, which are not present in the free aspirin spectra, indicating the presence of coordinated water molecules (Aliyu et al., 2009).

Antimicrobial testing results for the drugs and their metal complexes against *Escherichia coli*, *Staphylococcus aureus*, *Mucor species*, and *Candida* are summarized in Tables 4.1.9 and 4.2.1. The ligands themselves showed no activity against these bacteria and fungi at any concentration. Among the paracetamol complexes, only $[\text{Cd}(\text{par})_2(\text{H}_2\text{O})_2] \cdot 2\text{H}_2\text{O}$ and

[Cr(par)₂(H₂O)₂]Cl·2H₂O displayed minimal activity against *Escherichia coli* and *Staphylococcus aureus* at higher concentrations. Specifically, [Cr(par)₂(H₂O)₂]Cl·2H₂O was inactive against *Staphylococcus aureus* at all tested concentrations and showed no activity against *Mucor species*. However, [Cr(par)₂(H₂O)₂]Cl·2H₂O demonstrated significant antifungal activity against *Candida* across all concentrations, while [Ni(par)₂(H₂O)₂]·2H₂O showed low activity at higher concentrations and [Fe(par)₂(H₂O)₂]Cl·2H₂O showed no activity.

For aspirin complexes, there was low to moderate activity against *Escherichia coli* and *Staphylococcus aureus*. The Fe(III) and Cr(III) aspirin complexes did not inhibit *Mucor species*, whereas Cd(II) and Ni(II) complexes produced inhibition zones ranging from 8 mm to 28 mm at various concentrations. Antifungal activity against *Candida* was better, with inhibition zones ranging from 16 mm to 40 mm across different concentrations for Cd(II), Ni(II), Fe(III), and Cr(III). [Ni(Asp)₂(H₂O)₂]·2H₂O showed no activity at the lowest concentration (15 µg/disc).

Overall, metal complexes generally exhibited greater effectiveness than the free ligands. This enhanced activity is likely due to chelation, which decreases the metal atom's polarity and increases its lipophilicity, aiding its penetration through bacterial and fungal membranes. The variation in activity among the complexes may be due to their lipophobic nature and the fact that aspirin and paracetamol are bacteriostatic (Aderoju and Abiodun, 2016).

Based on melting point, conductivity, magnetic susceptibility, Job's method, and FTIR data, tentative structures for the metal complexes of paracetamol and aspirin are proposed.

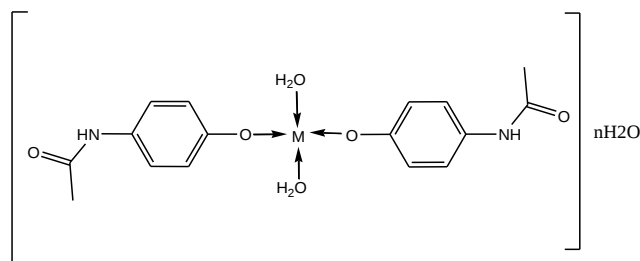


Figure 4.1. Proposed structure for [M(Par)₂(H₂O)₂] · nH₂O
M = Ni(II) and Cd(II) ions
n = 2

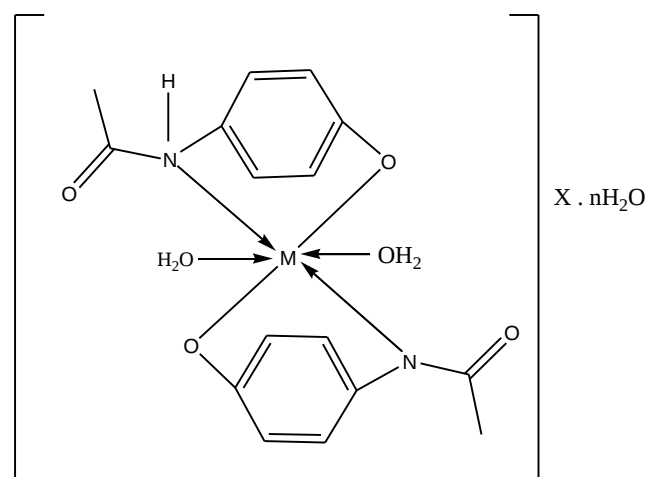


Figure 4.2. Proposed structure for [M(Par)₂(H₂O)₂]X · 2H₂O
M = Fe(III) and Cr(III) ions
X = Cl, n = 2

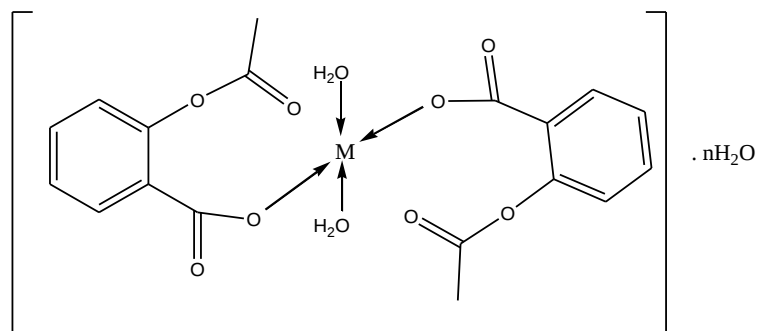


Figure 4.3. Proposed structure for $[M(\text{Asp})_2(\text{H}_2\text{O})_2] \cdot n\text{H}_2\text{O}$
 $M = \text{Ni(II)}$ and Cd(II) ions
 $n = 2$

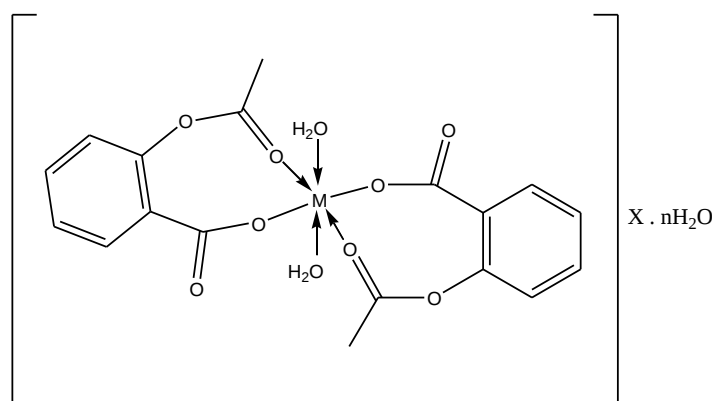


Figure 4.4. Proposed structure for $[M(\text{Asp})_2(\text{H}_2\text{O})_2]\text{X} \cdot n\text{H}_2\text{O}$
 $M = \text{Fe(III)}$ and Cr(III) ions
 $\text{X} = \text{Cl}$, $n = 2$

5. Conclusion

The study successfully synthesized and characterized complexes of divalent and trivalent transition metals with aspirin and paracetamol. These complexes were stable and demonstrated effectiveness against the tested bacterial and fungal species, unlike the parent drugs, which showed no activity.

The research highlighted the advantages of mechanochemical synthesis over traditional solution-based methods, suggesting that scientists worldwide should consider adopting this efficient synthetic approach for preparing complexes and other compounds.

6. Recommendations

For comprehensive characterization of these complexes, additional analyses such as single crystal structure determination, X-ray powder diffraction, and NMR spectroscopy (^1H and ^{13}C) are recommended.

Given that some synthesized complexes exhibited significant activity against specific microorganisms, further testing with a broader range of bacterial and fungal species is advised to explore potential enhanced inhibitory effects against other pathogens.

7. Declaration

The authors declared that there is no conflict of interest.

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Article

The Jurisprudential Approach to Interpreting the Qur'an, According to Al-Shahrastani

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Abstract: The current research aims to know the foundations and interpretive trends that Al-Shahrastani used to interpret the Holy Qur'an according to the verses that need interpretation or other meanings. Educational institutions, including universities, are particularly reliant on knowledge capital as one of their most critical strategic assets. It is a measure of the collective knowledge, skills, and experiences of the organization's members who make substantial contributions to the attainment of organizational objectives and the enhancement of performance. In order to attain professional excellence and continue their professional development throughout their career paths, lecturers and graduates have made job enrichment a primary objective in a rapidly evolving workplace. The University of Karbala, like other Iraqi universities, encounters numerous obstacles in its efforts to enhance the employment prospects of its faculty and students. The knowledge capital of the teaching personnel is one of the factors that influences this issue. The teaching staff is the foundation of the educational process, responsible for the transmission of knowledge and skills to students and the preparation of them for the labor market. The research structure consisted of four primary paragraphs: the first paragraph addressed the methodology, the second paragraph reviewed the literature related to the primary research variables and their sub-dimensions, the third paragraph focused on the results of the research analysis, and the fourth paragraph concluded the research by reviewing the conclusions and recommendations presented in light of the statistical analysis.

Keywords: Artificial Intelligence (AI), Decision-Making, Organizational Efficiency, Case Study, Technological Innovation

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1. Introduction

Abu al-Fath al-Shahrastani (d. 548 AH/1153 CE) is renowned as a historian of religions and sects as a result of his book al-Milal and al-Nihal. His book Nihayat al-Iqdam/al-Iqdam fi Ilm al-Kalam, which he compiled after al-Milal, was another highly respected work that established al-Shahrastani as an expert in the field of theology. Additionally, his work Musara'at al-Falasifa demonstrates his extensive knowledge of philosophy and jurisprudence. This leads us to the conclusion that al-Shahrastani is a multifaceted Islamic jurist and thinker. A particular aspect of this diversity is evident in the field of Quranic interpretation. In other words, al-Shahrastani is not only an interpreter but also a jurist, a philosopher, a theologian, and a historian of religions and sects.

Nevertheless, his commentaries on literature have not been widely acknowledged, and as a result, he has not been widely recognized as an interpreter., rhetoric, and Quranic interpretation.

In our current research, we shed light on al-Shahrastani's jurisprudential approach, foundations, and interpretive trends.

The current research methodology was characterized by the following:

First: The study problem

The study problem was represented by a fundamental question: What are the methodology, foundations, and interpretive trends that Al-Shahrastani relies on in his interpretation of the Holy Quran?

Second: The importance of the study

This title can achieve a set of results in the scientific and practical aspects, the most important of which are

1. To be a starting point for comparative research in the origins of interpretation and its methods, to establish a study of the different interpretation methods among the various Islamic sects and then select the best of them as an ideal or ideal method to be the pioneer in interpretation among the rest of the Islamic sects.
2. To identify the jurisprudential method, foundations and interpretive trends that have an input in the interpretation of the Holy Quran, especially the hermeneutical and esoteric ones.
3. To discover the different sources of interpretation to identify the specifications of the interpreter in detail among the various Islamic sects and to try to compare them with what the interpreter needs in the interpretive process in the present era.

Third: The aim of the research

The current research aims to know the jurisprudential approach, foundations and interpretive trends that Al-Shahrastani used to interpret the Holy Quran, and it can be summarized in the following points:

1. Finding the jurisprudential approach, foundations and interpretive trends that were launched in the interpretive approach or the interpretive source through the sultans of the court that were contemporary with it, whether it was a political authority, or an intellectual or cultural authority, or an ideological authority, and so on.
2. Reviewing many of the topics of the sciences of the Holy Quran to know their emergence and causes on the basis that they are a methodological mechanism for the science of interpretation and an introduction to it, and they may have a great impact on the differences in interpretations among Muslims.

2. Materials and Methods

The Research Plan

In the current research, we will discuss the jurisprudential approach, This article tries to explain Al-Shahrastani's ideas and approaches to understanding the Quran, focusing on his book Mafatih Al-Asrar and Masabih Al-Abrar. It also tries to give information about Al-Shahrastani's life and works.

Therefore, the current research is divided into two sections:

The first section: Al-Shahrastani's life and works

The second section is Al-Shahrastani's jurisprudential approach, foundations, and interpretive trends.

3. Results and Discussion

A. Section One: Al-Shahrastani's Life and Works

The first section deals with Al-Shahrastani's life and his most important scientific works, and accordingly, we will divide the current section into two branches: the first branch is his life, and the second branch is his works.

The first: His Life

"Abu Al-Fath Muhammad bin Abdul Karim bin Abi Bakr Ahmad Al-Shahrastani was born in Shahrastan, a region in Turkmenistan that is situated northwest of Khorasan and is bordered by the Karkum Desert. The date of birth was recorded in the books of biography (Al-Tabaqat) as 467/1074, 469/1076, or 479/1086. The latter date is considered the most accurate, as there is no information available regarding Al-Shahrastani's family, who lived during the Seljuk dynasty (1040-1157 AD). There is no significant information regarding his childhood or adolescence. Nevertheless, it is possible to conclude that he received a decent education, given the content of his works and the environment in which he resided, which was a significant center of knowledge."

According to the biographical works, al-Shahrastani initiated his education in his hometown at a young age, following his studies of the instrumental/auxiliary sciences, including the Arabic language and literature, mathematics, logic, and other disciplines.

Al-Shahrastani traveled to Nishapur to pursue additional scientific disciplines under the guidance of distinguished scholars in their respective domains. He engaged in the lessons of the teachers who were pupils of Imam al-Haramayn al-Juwayni (d. 478/1085) in this location. He was taught the principles of jurisprudence by Abu Nasr Abd al-Rahim ibn Abd al-Karim al-Qushayri (d. 514 AH/1120 CE) and Abu al-Muzaffar Ahmad ibn Muhammad al-Khawafi (d. 500 AH/1106 CE). One of Imam al-Ghazali's companions, he was a judge and a Shafi'i. He died in the year 505/1111 CE. Hadith was taught to him by Abu al-Hasan Ali ibn Ahmad al-Madini (d. 494 AH/1101 CE), and grammar, theology, and metaphysical philosophy were taught to him by Abu al-Qasim Salman (Sulayman?) ibn Nasir ibn Imran al-Ansari (d. 512/1118 CE). Abu al-Qasim al-Ansari, an ascetic and Sufi, was the scholar who had the most significant impact on al-Shahrastani. In his book, "The End of Introduction," Al-Shahrastani states, "We would frequently consult our master and imam, Abu al-Qasim al-Ansari." "

After completing his education in Nishapur, Al-Shahrastani relocated to Khwarazm to teach and evangelize. In 510 AH/1116 CE, he traveled to Hijaz to complete his academic studies and conduct the Hajj. Upon his return from Hajj, he made a halt in Baghdad and, with the assistance of As'ad ibn Muhammad al-Mahni (d. 527 AH/1132 CE), was able to teach at the Nizamiyya School. Additionally, he delivered numerous sermons. His sermons were particularly well-received in scholarly circles and were exceedingly popular. In 514/1120 CE, he relocated to Khorasan after spending approximately three years in Baghdad. He commenced his service as the minister of the Seljuk Sultan Sanjar (r. 512-548 AH/1118-1153 CE), Abu al-Qasim Nasir al-Din Mahmud ibn Muzaffar al-Marwazi (d. 530 AH/1135 CE). During this period, he was a member of Sultan Sanjar's inner entourage and became one of his confidants. During his ten-year residence in Khurasan, Al-Shahrastani penned his renowned work, *Al-Milal*, which he dedicated to the vizier Marwazi. Nevertheless, al-Shahrastani substituted the dedication in the introduction with a new one in 526/1132, when Sultan Sanjar adopted a stance that was in opposition to Marwazi. .

Al-Shahrastani served under the 'Alawi master (al-Naqib al-Ashraf) Abū al-Qāsim 'Alī ibn Ja'far al-Musawi (d. 550/1155) at al-Tirmidhi. The latter exhibited interest and reverence for scholars and philosophers. Al-Shahrastani sent the latter a copy of his two books, *al-Muṣārahah* and *al-Milāl*. The duration of al-Shahrastani's tenure in al-Tirmidhi and the date of his return to his homeland are unknown. However, his death records indicate that he spent his final years in Shahrastān. Two distinct dates have been assigned to his death; however, scholars have generally adopted 548/1153 as the accurate date. .

Second: His works

Although al-Shahrastani is well known in the scholarly world, only two of his students, Abu Saad al-Sam'ani (d. 562/1166) and Mujir al-Din al-Baghdadi (d.

592/1196), recorded and published his works. The fact that al-Shahrastani did not teach a large number of students, despite his reputation for great knowledge, can be attributed to the years he spent travelling and working with high-ranking government figures. In keeping with the scope of his vast scientific knowledge and scholarly personality, al-Shahrastani produced a considerable number of works in various fields. Although his works are not numerous, they are related to the history of religions and sects, theology, and philosophy and are of particular importance. The works that have come down to us today can be listed as follows:

1. *Al-Milal and al-Nihal*: This work, considered to be al-Shahrastani's masterpiece, was compiled in 521/1127-1128. According to some authors, such as Taj al-Din al-Subki, *al-Milal* is the most valuable work in the field of Islamic heresy, as al-Shahrastani's objective method and approach in citing the views of Islamic sects in a descriptive description of the method made this work of great value. The book, which has been printed and translated into many languages, was translated into French with the encouragement of Ibrahim Madkur. Daniel Guimart and Guy Monod translated the first volume. In contrast, the second volume was translated by Jean Jolivet, again with Guy Monod, under the title *Livre des Religions et des sectes* (Paris and Louvain, 1986, 1993).
2. *Nihayat al-Iqdam/al-Iqdam fi Ilm al-Kalam*: After *al-Milal*, al-Shahrastani wrote this work on theology. This work, which includes twenty basic topics, is based on the Ash'ari doctrine but criticizes it in some places, as do the Mu'tazila and some Shi'ite sects. The work was edited by Alfred Guillaume, with indexes (Oxford and London, 1934).
2. *Paths of the Philosophers*: This work was written in Tirmidhi after the *Religions* and dedicated to the noble Ashraf Abu al-Qasim Majd al-Din Ali ibn Ja'far al-Musawi. The book, also known as "*al-Musari'ah*", is a response to the views of Ibn Sina (d. 428/1037) on metaphysical topics. This work was later refuted in a treatise entitled "*al-Musari' al-Masaarih*", written by the Imami philosopher Nasir al-Din al-Tusi (d. 672/1274) and edited by Suhair Muhammad Mukhtar (Cairo, 1976).
3. *Mafatih al-Asrar and Masabih al-Abrar*: This book, which constitutes the main subject and source of this research, is al-Shahrastani's Qur'anic commentary, and the introduction to the Qur'anic sciences is followed by the interpretation of the first two surahs of the Qur'an (*al-Fatihah* and *al-Baqarah*); each verse is mostly interpreted in a common thematic manner and then the esoteric interpretations are presented under the subtitle (*Secrets*).
4. This book, which is believed to have been written in the years 538-540/1143-1145, was edited and published by Mohammad Ali Azarshab in two volumes (Tehran, 2008), from the only known manuscript copy of 433 pages, which is in the Library of the Majlis al-Shura Melli in Tehran. In addition, the introduction to *Mafatih al-Furqan* and the interpretation of *Surah al-Fatihah* have been translated into English by Toby Meyer under the title *Mafatih al-Asrar: al-Shahrastani's Esoteric Commentary on the Qur'an*. This book, which includes the original Arabic text, was published in collaboration with the Institute of Ismaili Studies in London (Oxford and London, 2009).
5. *A Treatise on the Subject of the Necessary Science of Existence (Risalah ila Muhammad al-Ilāqati)*: This work is addressed to the physician and philosopher Abu Abdullah Muhammad al-Ilāqati (d. 536 AH/1141 CE) and was published as an exact copy in a book written by the scholar Muhammad Reza Jalali Na'ini.
6. *A Question (Research) on Proving the Essence of the Individual*: This work, which deals with the smallest indivisible particle of matter (the indivisible

part), was published as an appendix to the book *The End of the Ancient* by Alfred Guillaume (Oxford and London, 1934).

7. A Council of Shahrastani's Writings that Dar Khwarazm has criticized: Some years ago, Abu al-Fath al-Shahrastani Na'ini wrote a book called *Sharh Hal and Athar al-Hujjat al-Haqq*, which had this work at the end. Under the title *Ma-jlis: Discours sur l'ordre et la création*, Diane Steigerwald translated it into French. It was released with the original text in Quebec in 1998 by Saint-Nicolas. Also, Steigerwald wrote a piece in which he says Shahrastani uses the idea of "divine word" in this book according to Ismaili terminology.
8. The Story of Our Prophet Joseph (Explanation/Tafsir of Surah Yusuf): This commentary is an interpretation of Surah Yusuf in the Qur'an. Azarshab reports that a manuscript copy of the work is located in the Azhar Library. Shahrastani composed this commentary in accordance with the esoteric, as per Ibn Taymiyyah (d. 728/1328), Ismaili concept (according to the Ismaili doctrine).

Although there are numerous sources that cite additional works by al-Shahrastani, it is uncertain whether they are still in existence. The following is a partial summary of some of them: (1) *Al-Manahij* and *al-Ayat*, (2) A letter to Muhammad al-Sahlanī, (3) "A letter to Judge Omar ibn Sahlān in response to Ibn Sīnā (Omar ibn Sahlān al-Sāwī wrote a letter in this book entitled A response to al-Shahrastani), (4) *Talkhīs al-Qasm li-Madhāhib al-Anam*, (5) *al-Uyūn* and *al-Anhar*, (6) *al-Irshād ila Aqīd al-Ibād*, "(7) A letter on the beginning and the return, (8) *Daqa'iq al-Awhām*, (9) The story of Moses and al-Khidr, (10) History of the wise.

B. The second section: The jurisprudential approach, foundations and interpretive trends according to Al-Shahrastani

Al-Shahrastani worked in his jurisprudential interpretive approach with several foundations and trends in order to move towards a complete interpretive encyclopedia built on important pillars. Accordingly, the current section can be divided into five branches:

The first branch: The authority of the Ahl al-Bayt in interpreting the Qur'an

In the argument of the chapter of his book *Al-Kafi*, Al-Shahrastani posits that the Imams of the Ahl al-Bayt are the ultimate authority in the interpretation of the Qur'an. He depicts the Imams in a manner that is similar to the narrations of Al-Kulayni: "They are the inheritors of the Qur'an," "They are one of the two great ones." "The two weighty things," and "They know the worlds and the two existences." Al-Shahrastani posits that the Imams, who are the genuine leaders of guidance, safeguard every aspect of the interpretation and interpretation of the Qur'an, just as the angels supervised every aspect of the revelation of the Qur'an, which came in the Almighty's saying:

" Verily We: It is We Who have sent down the Dhikr (i.e. the Quran), and surely, We will guard it (from corruption). " Managed by guardian angels, the protection of the remembrance itself is managed by the scholars (Imams of the Household) who are aware of the revelation; this is not through prediction or conjecture, but through absolute knowledge of the revelation and interpretation, the definitive and the ambiguous, the abrogating and the abrogated, the general and the specific, the ambiguous and the detailed, the absolute and the restricted, the apparent and the hidden, the command and the prohibition, the lawful and the unlawful, the limits and the rulings. Thus, according to al-Shahrastani, the companions agreed that the knowledge of the Qur'an belongs to the Household of the Prophet, and it is reported in the narration that the companions came to Ali and asked him: Did you have any special knowledge from the household of the Prophet other than the Qur'an? His saying (other than the Qur'an) indicates that the companions agreed that the news of the revelation of the Qur'an and its interpretation belongs to the Household of the

Prophet; in addition to that, Ibn Abbas worked alongside Ali. All scholars of interpretation accept the first, and the Prophet recited the following supplication to him: "O Allah, grant him the understanding of the religion and teach him the interpretation." Al-Shahrastani explains how he trained in the field of interpretation as follows: In my youth, I used to listen to my teachers about interpretation; and over time, I became well-versed in this field, and I recorded what I learned in the matter of interpretation from my teacher, Nasser al-Sunnah Abu al-Qasim Salman bin Nasser al-Ansari. Later, my teacher allowed me to obtain the hidden knowledge and correct principles of the Qur'an that came to us from the Ahl al-Bayt and their close companions.

On the other hand, a person [a divine being?] called to me from the side of a blessed tree to the right of the valley of that blessed place and said: "O Believers, fear Allah and be with those who are Truthful" As mentioned in the hadith about the Prophet Moses and his young companions who travelled a long distance and found the person they were looking for, which is mentioned in the Qur'an:" And they found a servant from among Our servants to whom we had given mercy from us and had taught him from Us a [certain] knowledge". "I also set out on the path of love, searching for faithful servants. Finally, I found one of God's righteous servants. .

Based on these statements, some scholars have claimed that al-Shahrastani's inclination towards Shi'ism may have come from Abu al-Qasim al-Ansari's interest in theology and philosophy, and Toby Meyer, who worked on *Mafatih al-Asrar*, claims that al-Shahrastani's original contact with the Ismaili esoteric heritage may have been through this person.

According to this claim, Abu al-Qasim al-Ansari was a secret Ismaili; however, as Taj al-Din al-Subki recorded, al-Ansari, who was famous for his Sufi identity, was a prominent poet and, according to Ayman Shahada's findings, we find it so, Toby Meyer's conclusion about Abu al-Qasim al-Ansari and al-Shahrastani that al-Shahrastani sharpened his views and interpretive methods of the Imams of the Ahl al-Bayt with the Qur'anic secrets he learned from his teacher Abu al-Qasim al-Sadiq al-Ansari, that the latter was in fact a secret Ismaili teacher, and that al-Shahrastani first became acquainted with Ismaili thought through this. The statement mentioned above of al-Shahrastani: "After that, my study of the valuable sayings and opinions narrated from the Ahl al-Bayt and their companions revealed to me the secrets of the Qur'an and its sound principles," is the best evidence of his commitment and obedience to the two weighty things.

In light of this, the following conclusions can be drawn: (1) in his youth, al-Shahrastani listened to the interpretation of the Qur'an from his teachers and recorded, in particular, the interpretations of his teacher Abu al-Qasim al-Ansari; (2) al-Shahrastani came to understand the secrets of the Qur'an by studying the sayings and opinions of the Ahl al-Bayt and their friends; and (3) a person (a divine being?) invited al-Shahrastani to be his faithful servant, and based on this invitation, he went in search, and finally found that faithful servant. According to Ayman Shahada, this mysterious faithful servant was either a contemporary of al-Shahrastani or a symbolic figure, indicating a deep source of Sufi knowledge; however, according to Toby Meyer, this unknown/unnamed person is someone other than Abu al-Qasim al-Ansari, the person who introduced al-Shahrastani to the Ismaili intellectual tradition – most likely a disciple of Hasan ibn Sabbah (d. 518/1124) or even the man himself.

Toby Meyer's views seem to be merely hypothetical; however, we can easily say that al-Shahrastani acquired philosophical wisdom through an unknown spiritual guide, a special source of knowledge, or through his study of the opinions and commentaries of the Imams of the Household. In fact, al-Shahrastani was the first to realize the linguistic specifications of the Qur'an, such as composition, arrangement, rhetoric, and

eloquence, in parallel with the knowledge he acquired in religious sciences and philosophical wisdom. Later, he understood that the divine word was an endless ocean of meaning; again, in keeping with the fruit of his intellectual journey, al-Shahrastani first commented on topics such as readings, grammar, linguistics, and semantics, and then presented the deep and hidden meanings of each verse. However, he did not invent these meanings; on the contrary, al-Shahrastani narrated what he learned from the commentaries of the famous people whom he described as righteous. In his interpretation of the Qur'an, al-Shahrastani sought refuge in God from interpreting according to his personal opinion, regardless of the narration and chain of transmission, which he emphasized repeatedly. However, he made very complex comments, especially under the sub-title Secrets. .

According to the author, these comments are not the product of his thought but are supposed to be manifestations of the wisdom he acquired through his teacher and/or through a deep source of knowledge. At the same time, these comments are the product of the spiritual power that emanated from this wisdom, and the fruit of the revelations that were revealed to him. For this reason, al-Shahrastani called his commentary *Mafatih al-Asrar* and *Masabih al-Abrar*, which emanates from and is in agreement with the theses of the Ahl al-Bayt.

The second branch: The systematic arrangement of the Qur'anic topics

It came in the introduction to the explanation of Al-Shahrastani's interpretive book, entitled *Mafatih Al-Furqan*, as it was distributed over twelve titles and topics that were discussed in the following order: (1) The first and last verses and the period of revelation of the Qur'an, (2) The issue of collecting the Qur'an, (3) The differences of the narrators in the order of revelation of the Qur'anic surahs, (4) Readings, (5) The desirable and undesirable matters for the reciters of the Qur'an, (6) The number of the Qur'anic surahs, verses, words and letters, (7) The prominent interpreters from the Companions and others from the Salaf, and the great works in the field of interpretation, (8) The meaning of interpretation and exegesis, (9) The generality of the specific, the clear and the ambiguous, and the abrogating and abrogated, (10) The divine rulings imposed and renewed on the principles of creation and age and the principles of multiplicity and hydration., (11) The miracle of the Qur'an in terms of composition, eloquence, guidance and others, (12) The conditions of interpreting the Qur'an. Very interesting and thought-provoking information, opinions and reviews are included under these twelve headings.

For example, in the section on the collection of the Qur'an, al-Shahrastani first narrates the successive collection and copying of the Qur'an by Abu Bakr and Uthman, referring to narrations from al-Bukhari's *Sahih* (d. 256/869). But he later cites a narration that says: "Some scholars said: There were many verses in the Qur'an about the virtues of the Ahl al-Bayt, so they deleted them." After that, al-Shahrastani narrates almost all the problematic narrations about the collection of the Qur'an; for example, he narrates that some verses were only found with a companion named Khuzaymah ibn Thabit and that the private copies of the Qur'an that were in possession of some companions, such as Ibn Mas'ud or Ubayy ibn Ka'b, had a different order and content from Uthman's copy. He goes on to say that there were some grammatical errors in Uthman's copy and that some chapters were initially much longer than they were in this copy. The author also tells us how some verses were excluded, such as the verse on stoning, but in the end, al-Shahrastani tells us that there was a consensus that Uthman's copy was the standard one. However, according to al-Shahrastani, this consensus is worthless, as Uthman's copy was crippled by many linguistic errors, as mentioned in the narrations mentioned above. This means that the Qur'an has been distorted and corrupted. At this point, al-Shahrastani says that he feels shocked and disappointed because when the Qur'an was collected and copied, Ali and his copy of

the Qur'an were ignored, even though Ali was a native Arab and was much closer to the Prophet. He surpassed all the members of the copying committee in his understanding of the Qur'an and his writing skills. However, Allah preserved the Qur'an through the Ahl al-Bayt, and thus the text of the Qur'an has reached us today, preserved from all types of distortion, change, omission or addition. .

It is interesting to think that these views were expressed by al-Shahrastani, who was known to be a Sunni, that Uthman's copy was full of grammatical errors and missing verses, followed by his claim that "the text of the Qur'an that we have today is preserved from all change and distortion" – attributing this protection to the people of knowledge. Although it is not stated how this came about – it creates a problem. But it is very difficult to explain that al-Shahrastani's views on this subject are parallel to those of some of the more extreme Shi'ite groups than the Ismailis. As is well known, the Ismaili sect has a strict understanding of the authenticity of the Qur'anic text, although it delves into esoteric interpretations.

The third branch: Defining and specifying the Qur'anic concepts

According to Al-Shahrastani, the topic of generality and specificity has dimensions that differ from its content in the Islamic jurisprudence method. However, many scholars have failed to specify indicators for specific words and concepts in the Qur'an that refer to a specific person/persons (identification of specificities). Al-Shahrastani says: "There is no general term in the Qur'an that is not specific, and no specification that is not specific" (There are no two lams in the Qur'an that are not specialized, and there is no specification that is not linked to personification); then he continues to give the following examples to support this thesis: The word "people" as a general term does not include children or rational people, but only those who are accountable, and the word "O you who believe" in the Qur'anic surahs is specific only to the people of the house and not to the rest of the believers .

The fourth branch: Sources of the Interpretive Explanation of the Qur'an

Sources of Explanation and Its Characteristics The sources used in al-Shahrastani's explanation can be divided into two categories, as the explanation consists of two dimensions. This double dimension is based on the division between revelation and interpretation and between the apparent and the hidden. Indeed, the principle of diversity of terms, which al-Shahrastani sees as one of the keys to the secrets of the Qur'an, represents this double dimension, and thus everything that has a concrete or abstract quality has two poles and two dimensions; for example, good and evil, beautiful and ugly, night and day, long and short, or black and white.

The truth is that everything in the Qur'an has two aspects: faith and disbelief, believer and disbeliever, and sin and good deeds. This double dimension applies to the Qur'an itself, which includes aspects of revelation and interpretation. Once again, the Qur'an also has an apparent and hidden aspect.

Al-Shahrastani, who repeatedly mentions the narrations of the apparent and hidden in the Qur'an, also often mentions the distinction between revelation and interpretation in the interpretation of many verses. According to him, revelation corresponds to the wording of the Qur'an, and interpretation corresponds to the deeper meaning. Again, based on this distinction, revelation is the subject of the science of interpretation, which is concerned with the apparent dimension, which includes language, grammar, rhetoric, linguistics, semantics, readings, and legal rulings. Interpretation is concerned with the deepest meanings and exploring the secrets of the Qur'an.

Based on this decisive distinction, Al-Shahrastani first explains a verse from the apparent dimension and then moves to the esoteric dimension, using different foundations and sources according to the two different styles of interpretation and

mentioning the sources he uses in the apparent hadiths. Among the linguistic sources that Al-Shahrastani refers to are names such as Al-Khalil bin Ahmad (d. 175 AH/791), Sibawayh (d. 180 AH/796), Al-Akhfash Al-Awsat (d. 215 AH/830), and Al-Muhammad. -Al-Asma'i (d. 216 AH/831), Abu Abdullah bin Al-A'rabrah (d. 231 AH/846), Tha'lab (d. 291 AH/904), Al-Azhari (d. 370 AH/980), Al-Jawhari (d. 370 AH/980). 400/1009). He also gives the opinions of commentators such as al-Fara' (d. 207/822), al-Tabari (d. 310/923), Abu Muslim al-Isfahani (d. 322/934), and al-Qaffal al-Shashi (d. 322/365/976). Al-Shahrastani also narrates from scholars of the Companions and Followers, as well as the Imams of the Household, in the interpretation of many verses. Still, he records the hadiths without a chain of transmission and gives special importance to the opinions of al-Qaffal al-Shashi among the sources of interpretation of the Qur'an mentioned, especially with regard to the connection between the verses. . . . According to the author himself, the primary source of the views and interpretations that comprise the distinctive section of the Keys to Secrets, i.e. the Secrets, are the Imams of the Household. It is most likely that al-Shahrastani, who bases his esoteric interpretations on the latter, took these interpretations from sources believed to be attributed to Imam Ja'far al-Sadiq and which are respected in the Ismaili esoteric tradition; among them: The Properties of the Qur'an, The Lamp of the Law and the Key to Truth, The Secrets of Revelation, The Hidden in the Science of Letters, and The Book of Monotheism and Management, which were transmitted by Mufaddal ibn 'Umar al-Ja'fi (d. 128/745). In fact, the narrations he narrated from Imam Ja'far al-Sadiq in the twelfth chapter of the introduction confirm this. In one of the statements in these narrations, Imam Ja'far responds to a person called Sadir al-Sayrafi, who asks whether the claim that the Imams of the Household have qualities such as receiving revelation is true or not. He says: "Do not honour those who talk nonsense about us, and we are the proofs of God and His agents over the people. Whatever we say is permissible or forbidden is from the Book of God."

As a result, it seems that the reason for including these sayings in the introduction is to indicate that a large number of the esoteric interpretations attributed to the Imams of the Household are based on the chain of transmission of Imam Ali (peace be upon them) to Ja'far al-Sadiq and that these interpretations differ from the esoteric ones for those who are ignorant of the apparent meaning. Another indication of the reliable sources when narrating the esoteric interpretations of the Shahrastanis is that most of the narrations of the interpretations about the Imams of the Household in Shi'i literature come from Imam Muhammad al-Baqir and Imam Ja'far al-Sadiq. The narrations about Imam Muhammad al-Baqir were mentioned in the interpretations of the Qur'anic verses in the commentary of Abu al-Jarud Ziyad ibn al-Mundhir (d. 150/767); this commentary has partially reached us today through the commentary of al-Qummi attributed to al-Qummi. However, the content of the narrations about Muhammad al-Baqir does not agree with the esoteric interpretations presented by al-Shahrastani under the title Secrets.

Al-Shahrastani does not limit himself to narrations alone; he also records his opinions and views on the mysteries of the Qur'an; however, he does not consider this his own opinion. This is because, as we have mentioned above, through his mysterious sage and/or source of wisdom and his contemplations on the sayings of the Imams of the Household, he acquired a spiritual ability that helped him discover the deep layers of the meanings of the Qur'an. Al-Shahrastani believes that his understanding and interpretation of the Qur'an are correct because of this spiritual competence. In contrast, the Qadarites, Mu'tazilites, Jabiris, Mishbihah, and other sects interpreted the ambiguous verses according to their personal opinions, especially those related to matters such as divine attributes, fate, and destiny. In this way, they erred in interpreting the Qur'an and reached incorrect conclusions.

In the same way, on the same topics, the Ash'arites also erred in interpreting the Qur'an. It is very interesting how al-Shahrastani marginalizes the Ash'arites and describes all these sects as confused and perplexed in terms of their understanding and interpretation of the Qur'an. He goes on to explain that the main reason for this is their inability to acquire knowledge from the true source and gateway to knowledge, namely Ali and his sons (the Imams of the Household). After discussing this matter, Al-Shahrastani narrates various accounts of Ali's virtues and his absolute authority in understanding the Qur'an, and then he narrates a number of accounts from Ja'far Al-Sadiq.

As the author said in General and Special, there is no general concept in the Qur'an for which a specific word has not been assigned, and there is no specification except within the specification. Accordingly, the attributes of those praised and criticized in the Qur'an can be traced back to specific people who lived during the period of the Qur'an's revelation, as well as to other people who lived after this period through specification. It is useful to explain this by quoting the author's explanation of the Children of Israel's worship of the calf, which he narrated in Q2:54. Al-Shahrastani begins his interpretation of the aforementioned verse by saying: "Those who fear the stories of the Qur'an said..." And he briefly records the following: Every example in the Qur'an has its example in the Muslim community. My intention. A tribulation similar to that which existed among the Children of Israel who worshipped the calf occurred in the Muslim community after the Prophet Moses ascended Mount Sinai. In other words, the Muslim community became slaves to the alleged caliphate, similar to the Children of Israel who worshipped the calf. These caliphs are the Umayyads whom the Prophet described as "I saw in a dream men stomping on my pulpit like donkeys." In fact, some of the Umayyads seized the right of caliphate from the People of the House, the friends of God and His friends, and some of them slaughtered them. When God ordered the Children of Israel to kill each other because of their worship of the calf, His wrath descended upon those who worshipped the calf in this nation, meaning those who martyred Hussein and became the people of the fire, i.e. the followers of the calf. Yazid. Even seventy thousand of Yazid's companions – may God increase their torment in the fire – were killed in a short period of time.

It is possible to communicate with the Imamis through the concepts of the *musta'in-mafrūgh*, which al-Shahrastani considers another important key to the secrets of the Qur'an. The following is an explanation of the basic content of these concepts: There are two different worlds and two different divine commands in the plane of existence. The *musta'in-mafrūgh* denotes the completed world that has reached the point of perfection; the divine decree concerning this world is final. No change is possible in the world of the *musta'in-mafrūgh*. The world of the exception and the fatwa have not yet reached perfection and, therefore, have not been completed.

For this reason, the divine rulings in the world of the *musta'in-mafrūgh* are endless. Suppose this distinction is not taken into account. In that case, if the whole world is accepted as the *musta'in-mafrūgh*, and all divine rulings are considered absolute and unchangeable, the idea of compulsion becomes inevitable. If the opposite is accepted, then delegation (complete freedom) is necessary. Both approaches are incorrect; the correct path is to take a path between these two paths that finds expression in the distinction between the *musta'in-mafrūgh* and the *musta'in-mafrūgh*. Al-Shahrastani believes that issues such as predestination (*qadar*), human actions, divine will and human freedom, as well as guidance and misguidance, which are among the most controversial topics in Islamic theology, can only be resolved by this distinction; for example, Q 2:26 says that God has led most people astray by giving examples of mosquitoes and the like, but at the end of the same verse it is stated that only those who have deviated are led astray. Both of these divine statements are certainly true, but the first is a divisive judgment, and the second is an enlightened judgment. There

is a dialectical relationship between these two decrees reminiscent of the relationship between the chicken and the egg. Then, when it is understood that the divisive, which is the decree, is brought about by the appeal and that the inferred judgment is derived from the divisive, it becomes clear that both the idea of predestination and the negation of predestination are incorrect. As for misguidance, we can say the following: God has led people astray, and they have strayed from the right path, but at the same time, these people have actually strayed from the right path, and God has led them astray. This means that immorality occurs with the misguidance of God's imams, and God misguides people because they have strayed from the path of truth by their own will.

The fifth branch: Interpretation and the Esoteric Trend in the Interpretation of the Qur'an

In Mafatih al-Asrar, in addition to many basic views and interpretations about the Imamate, the wills, the Imam, the guardian, and others, which are in line with the views of the Imamis, al-Shahrastani uses esoteric and literal interpretations, such as the letters of the syllable, the number seven, manna and quails, the staff of the Prophet Moses, and the twelve springs that came out of a rock, all of which are widely used in the books of Ismaili philosophers and Sufis with esoteric tendencies, as well as some Imami interpretations, including Muhyi al-Din Ibn al-Arabi (d. 638/1240) and Abd al-Razzaq al-Kashani (d. 736/1335). He also uses different concepts, such as the universal intellect, the universal soul, the tablet, the pen, the substitute, and pegs, all of which are characteristics that document al-Shahrastani's use of esoteric and philosophical sources in more general terms.

4. Conclusion

The current research aims to know the foundations and interpretive trends that Al-Shahrastani made for his interpretation of the Holy Quran. These foundations were characterized by fundamental rules that helped in interpreting what was esoteric or interpreted.

The current research reached the following most important results:

1. The interpretation of the Quran, Mafatih Al-Asrar, attributed to Al-Shahrastani, has the characteristics of works written within the framework of Shiite thought. However, the information related to the external interpretations of the verses presented under titles such as system, revelation, interpretation, language, and meanings is mostly descriptive and completely consistent with other Shiite and Sunni interpretations in terms of expression and content. This correspondence is not the primary characteristic but rather a secondary feature because the unique and original position of Mafatih Al-Asrar is not the door to explaining the external meaning but rather the door to interpretation related to secrets.
2. Moreover, most of the commentaries in the Secrets section, which can be found under the interpretation of almost every verse, are esoteric, while Mafatih al-Asrar, in its most general terms, can be described as an eclectic commentary; the verses are interpreted first according to their external meaning and then according to their esoteric aspects, with the two commentaries presented under separate headings (except in a few places); this is a clear indication of the eclectic structure of the work.
3. Shahrastani's esoteric commentaries are expansions of the concepts of esotericism and interpretation of the Imamis, especially the early Akhbari scholars, such as al-Kulayni, al-Ayyashi, and al-Saffar al-Qummi; all of them repeated in their works the narration: "The Qur'an has an external and an esoteric dimension," although what they are referring to here is not clearly stated, because in the Akhbari Imami school there is a repeated emphasis on the dual dimension of the Qur'an, using

the concepts of esotericism and interpretation; but no adequate clarification has been provided that would allow us to understand the deep meaning attributed to the concepts of esotericism and interpretation.

4. It is emphasized in the commentary that the sole authority for interpreting and explaining the Qur'an is the Imams. Moreover, the esoteric interpretations of the Imams of the Household are rarely mentioned in the Imami Shi'ite sources. More precisely, the Imami Shi'ite literature provides clear and understandable narrations from the Imams of the Household. Since interpreting the Qur'an by personal opinion was forbidden in the Imami Akhbari school, the scholars of this school refrained from interpretation. Al-Shahrastani took his place alongside the Akhbari school in the matter of interpreting the Qur'an by personal opinions. Still, he also stated that being familiar with the opinions and interpretations of the Imams regarding the Qur'an gave him wisdom and spiritual strength, which enabled him to make personal interpretations that were supported.
5. Al-Shahrastani combined the traditional/textual line of the Imamiyyah with Shi'ite wisdom and insight or gave an esoteric color to the external approach of the Imamiyyah in interpreting the Qur'an with interpretations based on a philosophical vision. In this way, al-Shahrastani constantly referred to the Imams of the Ahl al-Bayt, most often referring to Imam Ja'far al-Sadiq; more precisely, he used various works attributed to Ja'far al-Sadiq, which are also highly respected in the Ismaili tradition.
6. Al-Shahrastani's esoteric and literalist interpretations of some verses (especially those relating to the disjointed letters and the number seven), his attribution of certain Qur'anic concepts to specific persons, his assignment of symbolic meanings to them, and his use of concepts such as the creation of 'Umar, the counting of the tartub, and the divine word in parallel with Ismaili terminology should not be taken as evidence that he is an esoteric Ismaili. Rather, he used Ismaili terminology only as a tool to introduce philosophical depth to the thought of the Imami Akhbari school of thought. The identity that al-Shahrastani presented in *Mafatih al-Asrar* is a Shiite Akhbari Imami identity, not an Ismaili esoteric identity. His alienation of the Jabriyah, Murji'ah, Karamiyyah, and even Ash'ariyah, and his accusation of them of misunderstanding and misinterpreting the verses related to divine attributes, destiny, and human actions, is important evidence of the identity. What is presented, especially in *Mafatih al-Asrar*, is far removed from the extremist Sunni identity.
7. Al-Shahrastani's taking different positions in different works reminds us of the search for truth that al-Ghazali described in *al-Munqidh*. It is noteworthy that both Zahir al-Din al-Bayhaqi and Ibn Taymiyyah found similarities between al-Shahrastani and al-Ghazali and that each of them mentioned these two names in the same context. While al-Ghazali ended his journey in search of truth with rich Sunni Sufi wisdom, al-Shahrastani, as is evident from *Mafatih al-Asrar*, which he wrote in his last years, completed the same journey by arriving at philosophical philosophy—insight into the Shiite Imami matrix. In fact, al-Shahrastani showed his inclination towards Shiism by dedicating *al-Milal* and *al-Masarah* to al-Naqeeb al-Ashraf Ali ibn Ja'far al-Musawi and then reinforced his Shiite inclination in his interpretation of the Qur'an.
8. al-Shahrastani presented opinions parallel to the opinions of the Sunnis when necessary, for example, in the issues of the readings and the seven conditions, and thus we see that he was not bound to one sect; on the contrary, he was a free scholar, defending the opinion that he saw as correct without caring about the school to which he belonged, but it is necessary to emphasize that the identity reflected in *Mafatih al-Asrar* strongly indicates an inclination towards Shiism and not as a purely Shiite belief.

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