

Periodization models used in the current sport

Abstract

Traditional periodization has some characteristics that are the individualization of the training load, training load response based on biological laws and most of these models have the objective of the athlete archive the peak. The contemporary periodization has the following characteristics: individualized training load with monitoring of the physiological adaptation, training of the specific motor capacities of the modality, use of the evolution time and of the residual training effect for the coach prescribes the session, much attention with technical and tactical training and attention in the training with the injury level. Which periodization (traditional and contemporary) models are indicated to be used in contemporary sports? The objective of the review was to determining the types of periodization (traditional and contemporary) for each sport (individual, team, and combat). Traditional periodization has four types of periodization for the coach prescribes the training. The periodization models are the traditional periodization of Matveev, the pendular periodization of Arosiev and Kalinin, the high load system of Vorobiev and the periodization of the structural scheme of high-intensity loads of Tschien. Contemporary periodization are for the individual sport (block periodization, individualized periodization and ATR periodization), a model for the individualized and collective sports (periodization of the structural bells), five periodization for the collective sports games (periodization of long-form state, microstructure periodization, tactical periodization, non-linear periodization and selective load periodization) and a model for the volleyball (specific periodization for the volleyball). In conclusion, the coach that knows the periodization has more probability of success during a championship.

Keywords: volleyball, periodization, training, sports, performance.

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Introduction

Periodization began with the Greeks to prepare the athletes for the Olympic Games.¹ After the Russian Revolution of 1917 that the periodization study.² However, the periodization of the empirical period is few or is not used during the current sports training (origin of the Ancient Olympic Games until 1950).

Then, actually, the periodization models used for the sport performance are the traditional periodization (of 1950 to 1977) and the contemporary periodization (of 1978 to the present day).³ Traditional periodization has some characteristics that are the individualization of the training load, training load response based on biological laws and the most of these models has the objective of the athlete archive the peak.^{4,5}

The contemporary periodization models the characteristics are different of traditional periodization.⁶⁻⁸ The contemporary periodization has the following characteristics: individualized training load with monitoring of the physiological adaptation, training of the specific motor capacities of the modality, use of the evolution time and of the residual training effect for the coach prescribes the session, much attention with technical and tactical training and attention in the training with the injury level.⁹⁻¹²

Which periodization (traditional and contemporary) models are indicated to be used in contemporary sports?

Some sports training books recommended some models¹³⁻¹⁵ and scientific articles indicated some models.^{5,16} However, the books and articles do not indicate which models (traditional and contemporary) can be used in individual sports, in the team sports, and in the combat sports.

Then, the objective of the review was of determine the types of periodization (traditional and contemporary) for each sport (individual, team, and combat).

Periodization for each sport

Periodization is an important content of the sports training for the coach structure the training.¹⁷ The books of the sports training recommended several periodization models for the athletes¹⁸⁻²⁰ and the articles also.^{3,5} However, these references do not indicate the types of sports for each periodization model.

Only the article of Marques Junior²¹ determined the type of periodization for each type of sport. But this article is of 2011 and the author determined in five periodizations the types of sports. Actually, periodization researchers determined that has four types of traditional periodization and fourteen types of contemporary periodization.^{15,22,23} Then, the author of the study determined for the traditional periodization and for the contemporary periodization the sports that the periodization models are more recommended.

Traditional periodization has four types of periodization for the coach prescribes the training.¹⁵ The periodization models are the traditional periodization of Matveev, the pendular periodization of Arosiev and Kalinin, the high load system of Vorobiev and the periodization of the structural scheme of high-intensity loads of Tschien.^{5,22}

The Russian school of the sports training determined the group of sports that are the velocity and strength sports, the cyclic of resistance, the sports arts, the combat sports, and the collective sports games.^{24,25} Then, in table 1 the author of the article determined for the traditional periodization that is indicated in each sport.

Table 1 Traditional periodization of each sport

Periodization	The year that elaborated the model	Country	Velocity and Strength Sports	Cyclic of Resistance	Sports Arts	Combat Sports	Collective Sports Games
Traditional of Matveev	years 40 and 50	Russia	X	X	X	X	X
Pendular of Arosiev and Kalinin	1971	Russia			X	X	X
High load system of Vorobiev	1974	Russia	X				
of Tschiene	1977	East German	X	X	X	X	X

Note: The X indicates that the periodization is recommended for the type of sport. **Note 2:** Sports arts are the Olympic gymnastics, rhythmic gymnastics or similar

Lev Pavilovch Matveev elaborated his periodization in the years 40 and 50 and in 1952 this model was used by Soviet athlete for the Olympic Games of 1952.²⁶ In 1965, Matveev published the data of the Soviet athletes of the swimming, of the athletics and of the weightlifting.²⁷ This moment the sporting world has learned about the traditional periodization of Matveev.²⁸ The traditional periodization of Matveev is indicated for the coach used in several sports (velocity and strength sports, cyclic of resistance, sports arts, combat sports, and collective sports games) because it is a model of easy to understand by coach and the training loads is diluted.¹⁷ Then, the coach can prescribe at any time of the season with the objective of achieve the peak.

Pendular periodization of Arosiev and Kalinin was elaborated for combat sports and for sports with high technical and tactical demands.²⁹ Then, this periodization is indicated for the sports arts, the combat sports, and the collective sports games. This periodization has the characteristics of alternation between the general load and special load, but the special training load gradually increases during

the season.¹⁸ The objective of the alternation of the load (general and special) is that the athlete achieves the peak.

High load system periodization was proposed by Vorobiev for weightlifting.⁵ The training stimulus be higher, the coach prescribes with “jump loads” for the training to avoid stagnation.⁸ The objective of the alternation of the load (general and special) is that the athlete achieves the peak.

Periodization of the structural scheme of high-intensity loads of Tschiene is for individual sports of explosive strength and/or explosive resistance strength.³⁰ This periodization model all training is specific and with a high load, but the objective of the high load the athlete has high competitive level.³¹ The objective of the high load is that the athlete achieves the peak.

Table 2 the author of the article determined the category (beginner, medium level and high level) of the athlete that should practice each type of traditional periodization.

Table 2 Traditional periodization of each sport with the preparation of many years of the athlete

Periodization	Velocity and Strength Sports	Cyclic of Resistance	Sports Arts	Combat Sports	Collective Sports Games
Traditional of Matveev	B, ML, and HL	B, ML, and HL	B, ML, and HL	B, ML, and HL	B, ML, and HL
Pendular of Arosiev and Kalinin			B, ML, and HL	B, ML, and HL	B, ML, and HL
High load system of Vorobiev	ML and HL				
of Tschiene	ML and HL	ML and HL	ML and HL	ML and HL	ML and HL

Note: Category of the athlete that should use a type of periodization: beginner (B), medium level (ML) and high level (HL).

The periodization of the structural scheme of high-intensity loads of Tschiene is indicated for the medium and high level, but the coach can practice some adaptations in this model and apply it in the beginner.

The reader deserves to observe that the traditional periodization of the objective of the model is the athlete achieve the peak. Another observation, the schematic drawing of Matveev, of Vorobiev and of Tschiene has a similar format. Perhaps, these periodization researchers (are Vorobiev and the two researchers Arosiev and Kalinin) elaborated your schematic drawing on Matveev because in 1965 Matveev periodization became known in the world. Remembering, these authors created their periodization in the years 70 (Vorobiev in 1974 and Tschiene in 1977).

The contemporary periodization occurred from 1978 until the present day. The periodization literature determined a total of contemporary periodization.¹⁵ But this article informed about three periodizations were created for individual sport (block periodization of Verkoshanski, individualized periodization of Bondarchuk and ATR periodization of Issurin and Kaverin), a model for the individualized and collective sports (periodization of the structural bells of Forteza), five periodization for the collective sports games (periodization of long-form state of Bompa, microstructure periodization of Seirul-lo Vargas, tactical periodization of Frade, non-linear periodization of the Americans and selective load periodization of Gomes) and a model for the volleyball (specific periodization for the volleyball of Marques Junior). Then, the review studied 10 contemporary periodizations.

In table 3, the author of the review determined for the contemporary periodization based in the Russian school of the sports training of each sport.³³

Block periodization of Verkhoshanski was elaborated for explosive strength sports of the athletics (long jump, triple jump, and high jump).^{34,35} Then, in 1980 block periodization was used by several athletes of the explosive strength sports in the Olympic Games.^{36,37} After this Olympic Games, block periodization was used in other sports.³⁸⁻⁴⁰ In general, block periodization is divided into three

blocks of training.⁴¹ The block A the training is with the concentrated strength loads during 3 months, the block B the training is with the specific motor development in conditions similar the competition and the athlete practices explosive strength training (bodybuilding and plyometric training) during 2,5 to 3 months and the block C the athlete participates of the competitions and the coach prescribes a maintenance of the motor capacities trained (explosive strength training with bodybuilding and with the plyometric training).^{42,43} The duration of block C related to the competition and is the moment of the peak.

Table 3 Contemporary periodization of each sport.

Periodization	The year that elaborated the model	Country	Velocity and Strength Sports	Cyclic of Resistance	Sports Arts	Combat Sports	Collective Sports Games
Block of Verkhoshanski	1979	Russia	X	X		X	X
Individualized of Bondarchuk	1984	Russia	X				
ATR of Issurin and Kaverin	1985	Russia	X	X	X	X	X
Non-linear	End of the years 80	United States of America	X	X	X	X	X
of the structural bells of Forteza	1998	Cuba	X	X	X	X	X

Note The X indicates that the periodization is recommended for the type of sport. **Note 2:** Sports arts are the Olympic gymnastics, rhythmic gymnastics or similar

The individualized periodization of Bondarchuk⁴⁴ was elaborated for the hammer throw athletes. The duration of each period is according to the level of adaptation of the athlete with the objective of the athlete achieve peak. This peak in this periodization is in 2 to 8 months.¹⁴ However, individualized periodization can be used in other modalities of the athletics throwing, the javelin throw and shot put.

Issurin and Kaverin created in 1985 the ATR block periodization for the athlete has in many disputes a higher number of peaks.⁴⁵ The first study occurred with the Soviet team of the canoe/kayak paddling for the Seoul Olympic Games in 1988.⁴⁶ ATR block periodization is divided into three blocks, the accumulation, the transformation and the realization. The accumulation block has higher residual training because the coach prescribes aerobic endurance and/or aerobic resistance, maximal strength and basic technical, and tactical training.⁶ The transformation block has medium residual training because the coach prescribes specific training through special and competitive exercises with the objective of improving the physical preparation and the aspect technical and tactical of the athlete.⁴⁷ The realization block has a low residual training effect and the objective is the athlete achieve the peak during the championship (Issurin, 2008b). The ATR block periodization is indicated for several sports because the objective is to achieve many peaks during the season.^{48,49}

The traditional periodization of Matveev^{50,51} was very important for the sports training because this model was used to elaborate the non-linear periodization of the Americans⁵² and the periodization of the structural bells of Forteza.¹⁸ But the periodization of Forteza used another type of model to elaborate your content, used the pendular periodization of Arosiev and Kalinin.¹⁶

The non-linear periodization occurs an oscillation between the volume and the intensity of the strength training (of the bodybuilding

and of the reactive strength training).⁵³ This occurs in a few days and until in two weeks. Therefore, the same training program the athlete practices with a variation between volume and intensity.⁵⁴ This model was developed for sports with a long time of competition, for example, the collective sports games. But, other sports can use this model.

Periodization of the structural bells in each mesocycle occurs a predominance of the special loads in relation to the general loads and this forms a drawing of a bell on the macrocycle.¹⁸ The structuring of the bells quantifies the values of the general and special preparation load that the athlete deserves work in the season.⁵⁵ This model the coach can prescribe for several sports because this periodization is similar to the Matveev periodization.

Table 4 the author of the article determined the category (beginner, medium level and high level) of the athlete that should practice each type of contemporary periodization of five models.

The block periodization of Verkhoshanski is indicated for the medium and high level, but the coach can practice some adaptations in this model and apply it in the beginner. Oliveira⁵⁶ practiced in the young volleyball an adapted block periodization is the team had increased of the strength.

Figure 3 shows the creators of the block periodization, of the individualized periodization, of the ATR periodization and of the periodization of the structural bells.

Note, the non-linear periodization the creators were the Americans, but the name of the researcher the periodization literature has not determined.

In table 5, the author of the review determined for the contemporary periodization based in the Russian school of the sports training of each sport that was elaborated to the collective sports games.³³

Table 4 Contemporary periodization of each sport with the preparation of many years of the athlete

Periodization	Velocity and Strength Sports	Cyclic of Resistance	Sports Arts	Combat Sports	Collective Sports Games
Block of Verkhoshanski	ML and HL	ML and HL		ML and HL	ML and HL
Individualized of Bondarchuk	B, ML, and HL				
ATR of Issurin and Kaverin	B, ML, and HL	B, ML, and HL	B, ML, and HL	B, ML, and HL	B, ML, and HL
Non-linear	B, ML, and HL	B, ML, and HL	B, ML, and HL	B, ML, and HL	B, ML, and HL
of the structural bells of Forteza	B, ML, and HL	B, ML, and HL	B, ML, and HL	B, ML, and HL	B, ML, and HL

Note: Category of the athlete that should use a type of periodization: beginner (B), medium level (ML) and high level (HL).

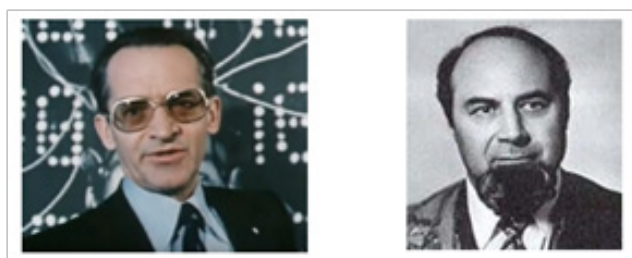


Figure 1 shows some of the creators of the traditional periodization.

Figure 1 In left Matveev and in the right Vorobiev (Extracted of <https://www.youtube.com/watch?v=rMhfCrBHnJY&fbclid=IwAR3ePFXZ-Elu3FM6YNF5rbrh0mybAjICgP6NvYm39ypODYCjuEKRYJjXyK8> and of <https://tr.fehrplay.com/sport-i-fitness/I03894-arkadiy-vorobev-biografiya-sportivnye-dostizheniya-foto.html>).

form, high state of sport form and optimal state of sport form) and the coach needs to develop these contents during the season.^{4,29} Bompa^{59,60} informed that different types of exercises can train the three form states. However, this periodization is a model good for the combat sports because Oliveira⁶¹ informed that this modality is a complex sport that has two sports, the collective sports games and the fights. Therefore, this periodization is for sports with long competition time.



Figure 3 From left to right we have Verkhoshanski (Extracted of <https://www.youtube.com/watch?v=0kTKJ5PJfz4> or https://www.youtube.com/watch?v=6ruo9IPzi_U), Bondarchuk (Extracted of https://en.wikipedia.org/wiki/Anatoliy_Bondarchuk), Kaverin and Issurin (Extracted of <https://slidex.tips/download/block-periodization-in-sport-training-scientific-concept-and-implementation>) and Forteza (Extracted of <https://www.efdeportes.com/autor/forteza.htm>).

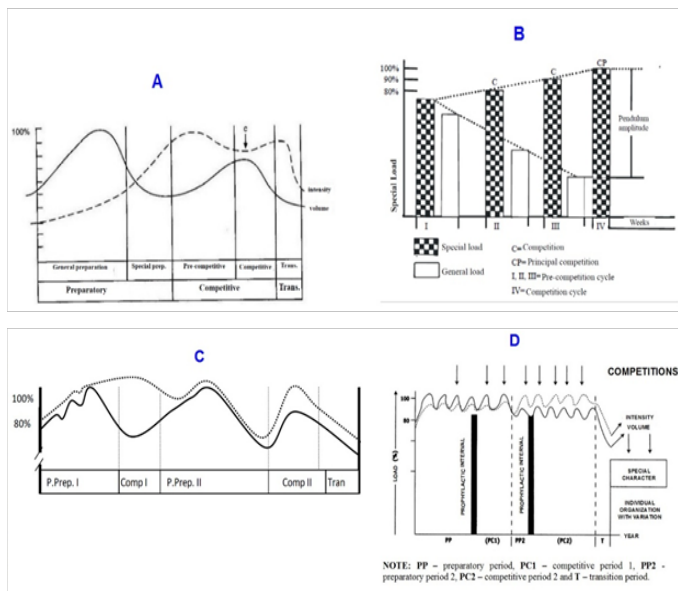


Figure 2 shows the schematic drawing of each periodization model.

Figure 2 Schematic drawing of the (A) traditional periodization of Matveev²⁵, (B) pendular periodization of Arosiev and Kalinin¹⁸, (C) high load system of Vorobiev³² and (D) structural scheme of high-intensity loads of Tschiene.³⁰

Bompa elaborated the periodization of long-form state for the collective sports games adapted of Matveev periodization.⁵⁸ This author informed that had three form states (general state of sport

Seirul-lo Vargas⁸ elaborated the microstructure periodization for the collective sports games for the player to develop the cognitive aspect. The training is elaborated with four types of tasks – general, directed, special and competitive. For the team to achieve this optimal form, it is necessary to elaborate in the periods (pre-season and competitive) the appropriate exercises for each task (general, directed, special and competitive) with a training load compatible with the athletic condition of each player. The load is always specific in this periodization.⁶² The concentrated volume of the specific load is adapted to the block periodization of Verkhoshanski and occurs in the pre-season.⁶³ In the competitive period the concentrated volume of specific load changes is the name of season block and this block the coach prescribes training and occurs championship game. Seirul-lo Vargas⁸ elaborated this periodization in the soccer, but this model the coach can use in other collective sports games.

Tactical periodization of Vitor Frade was elaborated in 1989 with the objective of prepare quickly the soccer team tactically.⁶⁴ The coach needs to elaborates the game model to develop a good match during the competitive period.⁹ All training occurs in the game until the physical training.⁶⁵ But this periodization the coach can use in other collective sports games.

The selective load periodization of Gomes was elaborated for the soccer with the objective of training during a period an or two

motor capacities.¹⁴ In this model, the volume changes little during the competitive year, except in the pre-season that it is a little lower. The intensity is usually high all year because the preparation of the athlete occurs during the competition. Therefore, there is no preparatory period, only the pre-season phase that occurs before the dispute and

usually is in a few weeks.³¹ This model does not have the objective of establishing the athletes the peak of the sports form, but the objective is to cause a competitive regularity. The selective load periodization the coach can use in the collective sports games, in the combat sports, and in the sports arts.

Table 5 Contemporary periodization of each sport

Periodization	The year that elaborated the model	Country	Velocity and Strength Sports	Cyclic of Resistance	Sports Arts	Combat Sports	Collective Sports Games
of long-form state of Bompa	1984	Romania				X	X
Microstructure of Seirul-lo Vargas	1987	Spain					X
Tactical of Frade	1989	Portugal				X	X
Selective load of Gomes	2001	Brazil			X	X	X
Specific for the Volleyball of Marques Junior	2011	Brazil					X Only for the volleyball

Note The X indicates that the periodization is recommended for the type of sport. **Note 2:** Sports arts are the Olympic gymnastics, rhythmic gymnastics or similar

Table 6 Contemporary periodization of each sport with the preparation of many years of the athlete

Periodization	Velocity and Strength Sports	Cyclic of Resistance	Sports Arts	Combat Sports	Collective Sports Games
of long-form state of Bompa				B, ML, and HL	B, ML, and HL
Microstructure of Seirul-lo Vargas					B, ML, and HL
Tactical of Frade				B, ML, and HL	B, ML, and HL
Selective load of Gomes			B, ML, and HL	B, ML, and HL	B, ML, and HL
Specific for the Volleyball of Marques Junior					B, ML, and HL

Note Category of the athlete that should use a type of periodization: beginner (B), medium level (ML) and high level (HL).

Specific periodization for the volleyball of Marques Junior the training load is with the volleyball skill effort and level of volleyball skill injury.⁶⁶ This content is used in the game situation training and in the technical training.⁶⁷ But the game situation training subjective control is difficult.¹¹ The strength training is the physical training more important this model with the explosive resistance training and reactive strength.⁶⁸ This physical training the coach can prescribe with the ball training or only physical training. Therefore, this periodization is a model for the volleyball and in another collective sports games this model is not indicated.⁶⁹⁻⁷¹ However, this model needs of scientific studies because actually there are only two studies.^{72,73} Therefore, this periodization is until this moment a theory.

The table 6 the author of the article determined the category

(beginner, medium level and high level) of the athlete that should practice each type of contemporary periodization of collective sports games.

Figure 5 shows the creators of the periodization of long-form state, of the microstructure periodization, of the tactical periodization, of the selective load periodization and specific periodization for the volleyball.

The figure 6 shows the schematic drawing of each periodization model.

The review article informed about some types of periodization for the reader use in the most appropriate sport and according to the athlete's category.

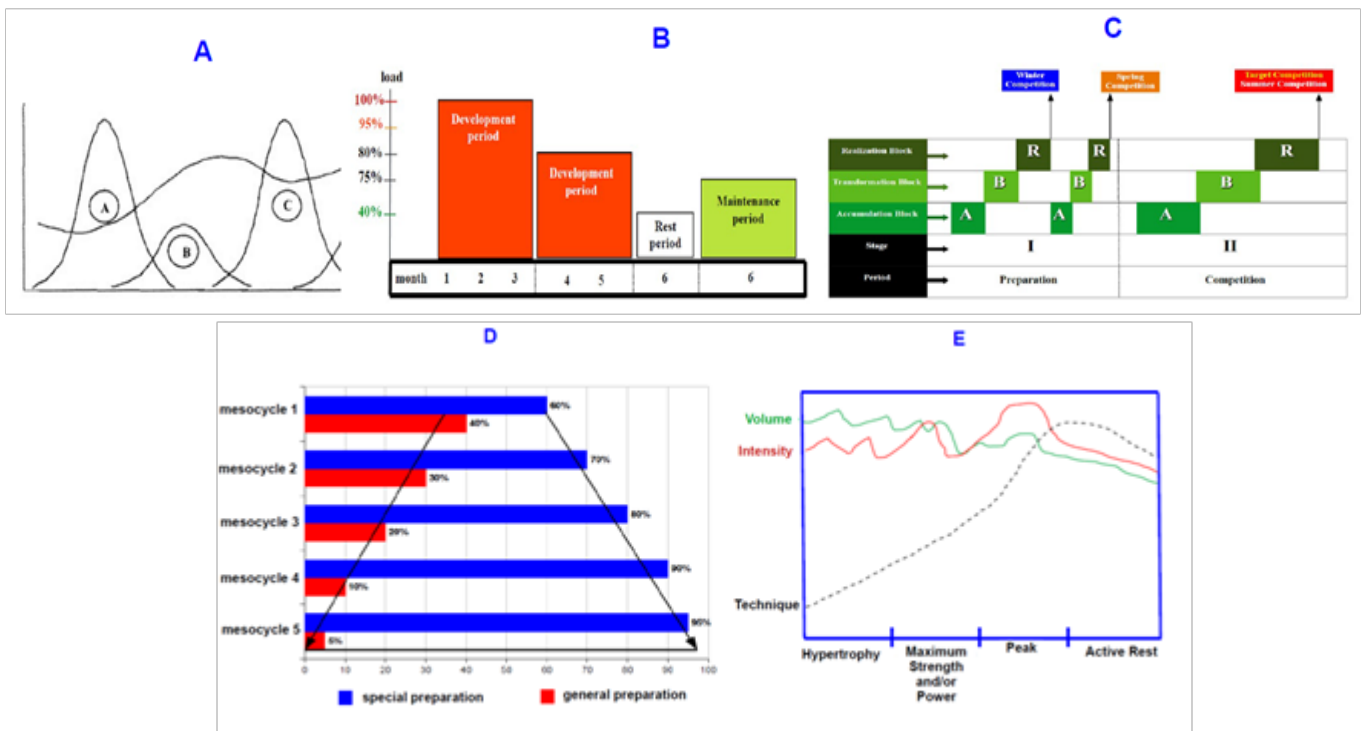


Figure 4 Schematic drawing of the (A) block periodization of Verkhoshanski and Siff²⁷, (B) individualized periodization of Bondarchuk⁴⁴, (C) ATR block periodization of Issurin and Kaverin⁴⁷, (D) periodization of the structural bells of Forteza¹⁸ and non-linear periodization.⁵³



Figure 5 From left to right we have Bompa (Extracted of <https://tudorbompainstitute.wordpress.com/dr-tudor-bompa/>), Seirul-lo Vargas (Extracted of <http://www.entrenamiento deportivo.org/curiosidades.asp>), Vitor Frade (Carvalho, 2001), Antonio Carlos Gomes (Extracted of <http://buscatextual.cnpq.br/buscatextual/visualizacv.do?id=K4798496Z9>) and Marques Junior (Extracted of <http://buscatextual.cnpq.br/buscatextual/visualizacv.do?id=K4237410T5>).

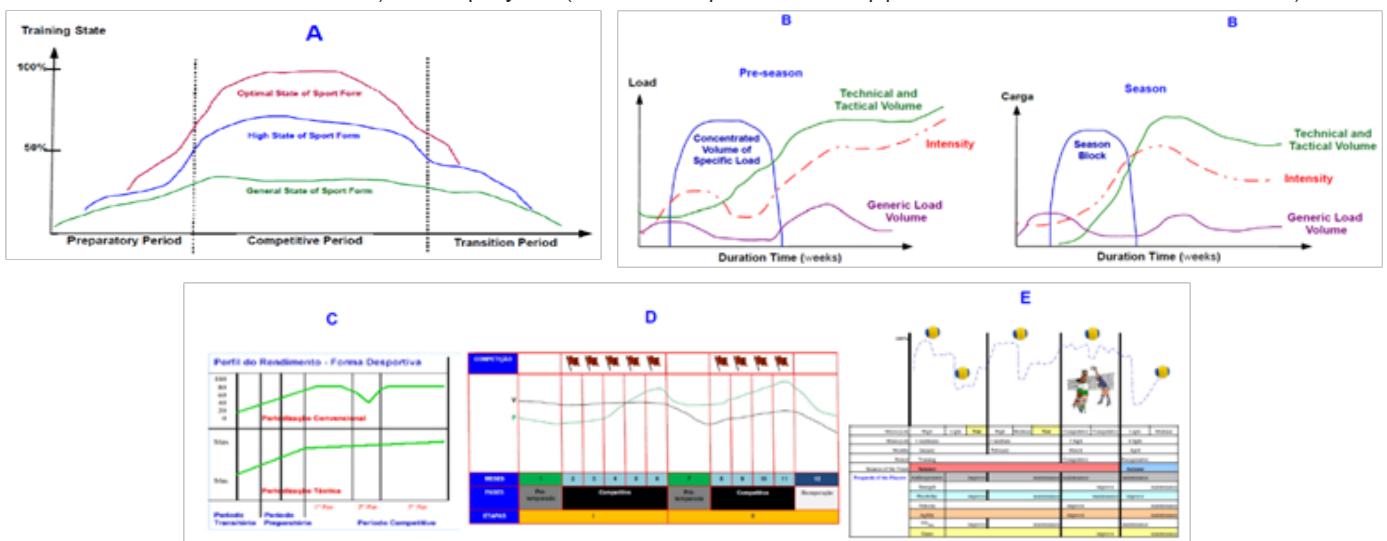


Figure 6 Schematic drawing of the (A) periodization of long-form state Bompa¹¹, (B) microstructure periodization of Seirul-lo Vargas⁸, (C) tactical periodization of Vitor Frade⁹, (D) selective load periodization of Gomes¹⁴ and (E) specific periodization for the volleyball of Marques Junior.⁶⁷

Conclusion

Periodization had more attention from 1965 when Matveev presented the data of Soviet athletes in a book.²⁷ Then, this moment, the coaches adopted periodization of how a good content for the coach elaborated and prescribe the training. Then, after this moment, the researchers practice several studies from 1971 to 2011 that resulted in other periodization models. However, the article determined the type of sports of each periodization (is traditional and contemporary) and the category of the athletes for these models. Therefore, this review was an article that improved of the first work of Marques Junior.²¹ In conclusion, the coach that knows the periodization has more probability of success during a championship because the organization of the training is very important in the high-performance sport.

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